# THE Journal

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OCTOBER

1952

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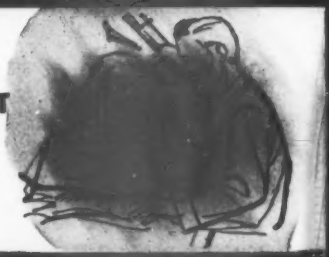

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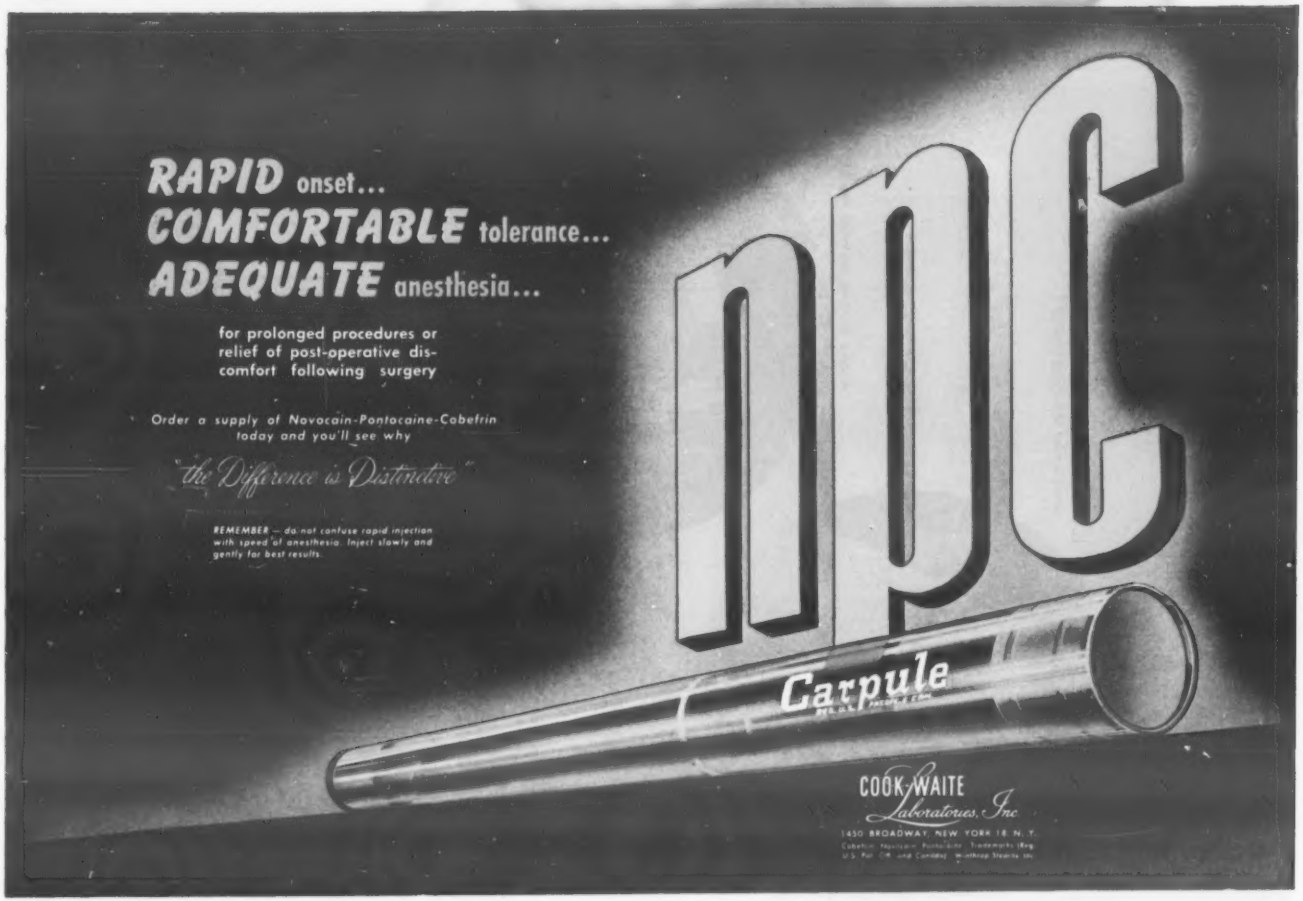
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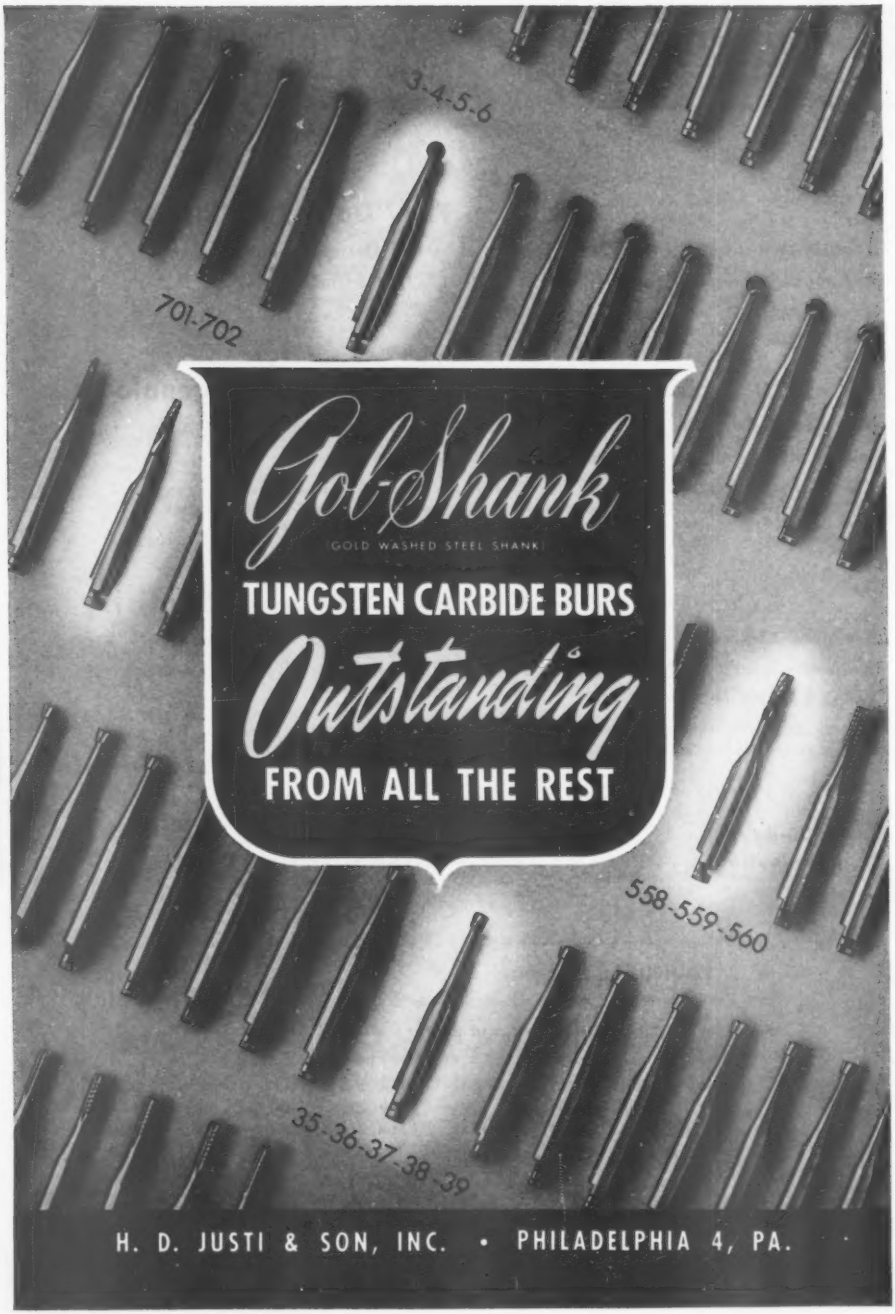
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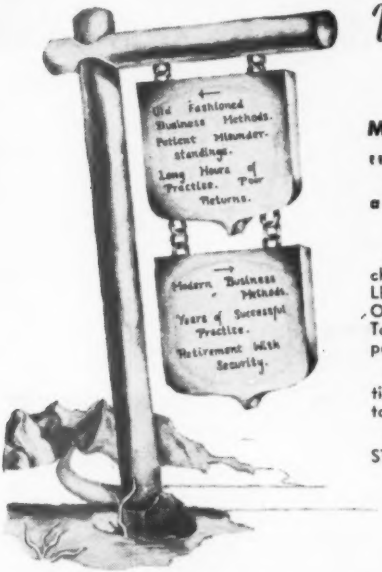


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# Malocclusion—its prevention

*Robert B. Hedges, D.D.S., M.S., Jenkintown, Pa.*

In any branch of the healing arts the practice of the preventive phases accomplishes a great deal more than the treatment of diseased or abnormal situations. Unfortunately, in orthodontics, as in most other fields, malocclusions occur so frequently that major efforts must be expended in correction rather than in prevention. To the pedodontist, general practitioner, and even to the pediatrician falls the responsibility of recognizing certain situations and recommending preventive therapy.

A great deal has been written on the subject of prevention of malocclusion, but unfortunately the recommendations for prevention cover only a small area of the field. Speidel[1] has stated the problem in the following concise manner: "If we know the causes, if the causes are controllable, and if the means of applying these controls are available, we can prevent a condition." It is well then, to reanalyze the problems involved in malocclusion and attempt to fit them into the preceding requisites.

## ETIOLOGIC FACTORS IN MALOCCLUSION

Etiologic factors of malocclusion are divided into the same categories as they are in any other field—hereditary, congenital and environmental. The hereditary factor is probably the most important one with which an orthodontist must contend.

It is currently thought by many authorities that the growth pattern along which an individual will develop is a

Presented before the Section on Orthodontics, ninety-second annual session, American Dental Association, Washington, D. C., October 17, 1951.

Associate professor and chairman of the department of orthodontics, Temple University, School of Dentistry, Philadelphia.

1. Speidel, T. D. Prevention of malocclusion. North-West Den. 30:59 (Jan.) 1951.

morphogenetic pattern laid down prior to birth.[2] This means that there is a certain definite arrangement of genes at the time of conception which determines the morphology of the individual. If the individual develops to his ultimate potential, then he will have progressed along a definite pattern of growth. This is evident in the children who definitely resemble their parents. But what about the child whose parental resemblance is very vague? He, too, is just as much a product of heredity and develops to his own characteristic potential. There are, therefore, a great proportion of malocclusions the etiologic factors of which are known but are not controllable.

The congenital causes are those which are inborn, those which occur in the metabolic processes prior to birth. By the definition of the term congenital, the defect should be observable at birth, but, because of the time factor involved in development, the congenital defect may not become apparent until many years after birth. Such is the case of a congenitally missing tooth where proper proliferation has not occurred in the embryonic phase and, consequently, there is no tooth germ to develop at a much later time. Here again, the congenital factors are not controllable.

The environmental causes are those which may be controlled most satisfactorily. Those of systemic origin are primarily the responsibility of the physician. The growth centers which are active at the time when a debilitating disease or accident occurs will be affected in proportion to the severity of the condition. If the physician can guide the child through an uneventful healthy childhood, growth should reach the maximum individual potential. The factors of local origin are dealt with by the general practitioner of dentistry and the pedodontist. The local factors, such as space maintenance, proper restorations, early and late exfoliation, and habit breaking, are numerous and attention has been focused on them in current teachings and in much of the literature.[3-5, 1, 6-8]

Often these local environmental factors will be complicated by other uncontrollable factors and, therefore, the malocclusion can be only partially prevented. To prevent completely the development of malocclusion by the elimination of local factors, an individual must have an inherently acceptable morphogenetic pattern and must have enjoyed normal prenatal and postnatal development.

## GROWTH OF THE FACE

To better understand certain inherent limitations as well as the possibilities for prevention of malocclusion, some thought must be given to the growth of the face. For the past 20 years operators have had at their disposal an accurate means of studying bony facial growth.[9, 10] Cephalometric roentgenography has clearly demonstrated the intricate correlation of development of the various parts of the face, and this has made possible a rational approach to the assessment of balance and harmony of the various components of the face.[11] The maxilla grows (Fig. 1) by deposition of bone in three primary regions: the frontomaxillary suture, the zygomaticomaxillary suture, and the tuberosity region. There

2. Brodie, A. G. On the growth pattern of the human head from the third month to the eighth year of life. Am. J. Anat. 68:209 (March) 1941.

3. Hedges, R. B. Importance of orthodontics in children's dentistry. J. New Jersey D. Soc. 20:12 (Jan.) 1949.

4. Martin, R. Space retention. Fort. Rev. Chicago D. Soc. 21:5; 21:22 (Feb. 15) 1951.

5. Salzmann, J. A. Prevention and interception of malocclusion. Am. J. Orthodont. 34:732 (Sept.) 1948.

6. Thometz, R. C. Malocclusion, the dentist's role in its prevention. Illinois D.J. 18:169 (May) 1949.

7. Weber, F. N. Prophylactic orthodontics. Am. J. Orthodont. 35:611 (Aug.) 1949.

8. Willett, R. C. What types of malocclusions are preventable. J.A.D.A. 31:1066 (Aug. 1) 1944.

9. Broadbent, B. H. Bolton standards and technique in orthodontic practice. Angle Orthodont. 7:209, 1937.

10. Broadbent, B. H. A new x-ray technique and its application to orthodontia. Angle Orthodont. 1:45, 1931.

11. Downs, W. B. Variations in facial relationships; their significance in treatment and prognosis. Am. J. Orthodont. 34:812 (Oct.) 1948.

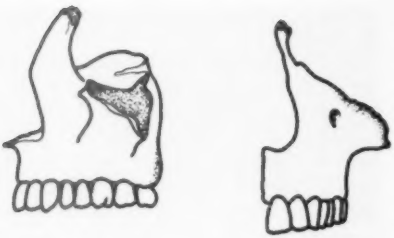

*Fig. 1 • Growth centers of maxilla*

are certain other regions, such as the floor of the nose, the floor of the orbit and the alveolar process, where a compensatory deposition and resorption take place to maintain facial proportions. The deposition of bone at the primary centers provides growth in an upward and backward direction with the result that the maxilla is forced downward and forward away from the cranium.

In the mandible (Fig. 2) deposition occurs at the condyle and along the posterior border of the ascending ramus with resorption taking place along the anterior border of the ascending ramus. Here again, there is a compensatory deposition along the alveolar border to keep the lower face in proportion. This, too, is growth in an upward and backward direction resulting in a spatial movement of the mandible away from the cranium in a downward and forward direction. It should be noted that the actual morphology of the mandible does not change with age.[2] The angle which the ramus forms with the body of the mandible remains the same throughout life. The apparent change in the angular relation between these parts is an illusion caused by the fact that the condyle occupies a constantly higher level during this growth process. Because growth takes place at the posterior portion of the mandible, the actual increase in over-all width is one of divergent extension. An analogy can be made with the letter "V." The further the arms are extended, the larger is the letter "V." If all of the local and systemic environmental factors are controlled, if there are no congenital defects, and if the hereditary influence is acceptable, then the ultimate end will be a face which is in satisfactory harmony and balance (Fig. 3, center). It is in this type of face that the proper use of environmental preventive measures will eliminate a malocclusion.

There is, however, the face in which the morphogenetic pattern is one in which there are certain discrepancies in one or more planes of space. Figure 3, left, shows an individual with a retrusive type of face. Here there may be certain dysplasias in the anteroposterior plane of space[12] as well as greater growth in the vertical direction than in the horizontal. This is a definite pattern and is destined from the start to become the typical retrusive face with heredity as the responsible etiologic factor.

The other extreme (Fig. 3, right) is the face which is characterized by mandibular prognathism. This, as was seen in the Hapsburg family, is a dominant hereditary characteristic and possesses even greater morphologic variations from normal. This is particularly true in the mandibular area and is often accompanied by maxillary dysplasias.

12. Wylie, W. L. Assessment of anteroposterior dysplasia. Angle Orthodont. 17:97 (July-Oct.) 1947.

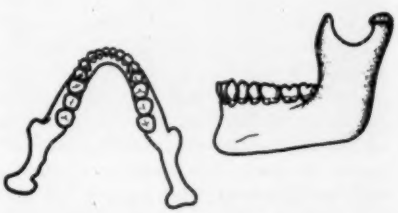

*Fig. 2 • Growth centers of mandible*

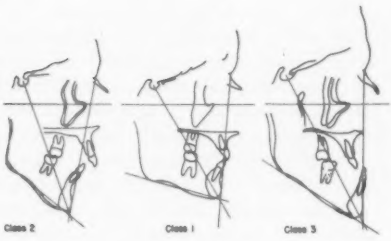


*Fig. 3 • Left: Retrusive type of occlusion. Center: Harmonious occlusion. Right: Mandibular prognathism*

It appears, therefore, that each face is endowed with a certain growth pattern and a certain potential which will be reached if all other factors are normal. The absolute direction of growth does change to a certain degree, but this is believed to be part of the over-all growth pattern.[13,14] This basic facial pattern, cannot be changed by orthodontic means once it has developed fully.[15] This does not mean that the dental discrepancy or malocclusion cannot be corrected, for indeed it can. The corrected malocclusion, however, will still be situated in the same basic facial pattern.

## PREVENTION OF MALOCCLUSION

Prevention of malocclusion is possible, therefore, in that small group of cases in which a satisfactory occlusion will develop if certain environmental factors potentially productive of malocclusion can be eliminated or controlled. These cases are often characterized by the loss of arch length due to drifting of teeth. The prevention of this type of malocclusion is the proper restoration and maintenance of the hard structures, and, needless to say, is in the province of the operative dentist. The maintenance of space, the breaking of habits, and correction of other factors fall into this category. This area has been amply covered in the literature.[2-5,7,8] If these measures are employed in cases where the facial pattern is less satisfactory, the effect will be to lessen the severity of the malocclusion, or make orthodontic therapy more successful at a later date. Sufficient emphasis cannot be placed on the necessity of pursuing these measures even though the effect may be minimal. In certain instances where considerable crowding occurs, a series of teeth may be

13. Brodie, A. G. Facial patterns: a theme on variation. Angle Orthodont. 16:75 (July-Oct.) 1946.

14. Wylie, W. L. Malocclusion—malady or malformation? Angle Orthodont. 19:3 (Jan.) 1949.

15. Brodie, A. G., and others. Cephalometric appraisal of orthodontic results. Angle Orthodont. 8:261 (Oct.) 1938.

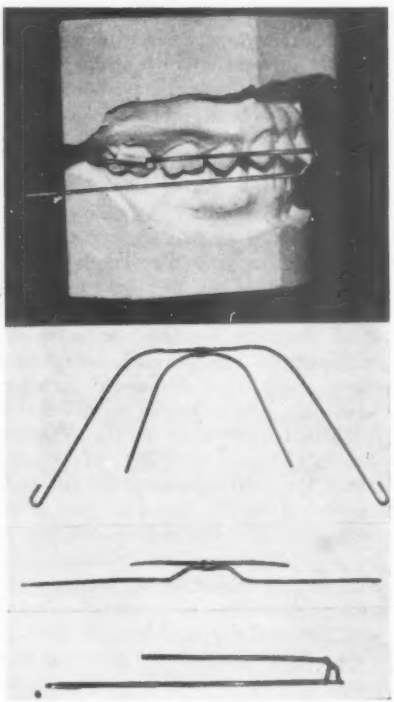

*Fig. 4 • Head cap arch used to apply occipital force*

*Fig. 5 • Patient wearing arch and face bow*

extracted, starting in the deciduous dentition. This may result in an acceptable permanent occlusion.[16] In a sense this can be thought of as preventive therapy, but each situation requires considerable thought and investigation to determine the possibilities of the potentiality of growth.

## EFFECT OF ORTHODONTIC INTERVENTION

Earlier investigation seemed to indicate that the effect of orthodontic intervention was limited to the region of the alveolar process.[15] This is true of strict orthodontic tooth movement. As investigation has progressed more possibilities for early intervention in the growth processes seem to be feasible. Perhaps this is better referred to as guidance of growth. The maxilla and mandible are suspended from different areas of the cranial base and it is only the pattern of growth which makes them develop harmoniously. If there is some dysplasia between these parts, and each part has a certain potential to attain, then malocclusion will occur unless it is possible to guide this developing period. Reference is made specifically to the individual with a retrusive or Class II occlusion, where there is a discrepancy in the anteroposterior relation between the maxilla and the mandible, the mandible being more retrusive, or the maxilla being more protrusive, or a combination of both.

Most of the facial growth seems to have occurred prior to the complete eruption of the permanent dentition so that the correction of this retrusive situation in the permanent dentition stage is one of change in tooth position, or a change in the spatial position of the supporting bone as evidenced by a more forward position of the mandible in re-

16. Nance, H. N. The limitations of orthodontic treatment. I. Mixed dentition diagnosis and treatment. Am. J. Orthodont. & Oral Surg. 33:177 (April) 1947.

*Fig. 6 • Nine year old girl with normally growing face. Because of misuse of labial musculature, upper incisors were beginning to protrude*

lation to the cranium.[17] Successful treatment is more often attained when growth has been recorded during this period. Change is usually accomplished by the use of the conventional intermaxillary elastic ligatures. Sometimes a forward drifting of the entire mandibular denture resulting from the pull of the elastic ligatures is observed. To enlist the aid of the growth factors, treatment must be instituted at an earlier period at which time there is more active growth. At such a time, however, the entire dentition is in a dynamic state and is prone to disruption from the use of intermaxillary elastic ligatures.

If an advantageous change in this Class II, or distoocclusion, situation is desired without disturbing the mandibular denture, some external means of establishing pressure is necessary to guide the growth of the maxilla. Several years ago Oppenheim[18] advocated the use of light intermittent force as a means of correcting this anomaly. It remained for Kloehn[19] to point out in 1947 that through the application of occipital force on the maxillary denture growth and eruption could be guided to the extent that further orthodontic therapy, in some cases, could be obviated.

The application of occipital force may be instituted in the mouth of the most apprehensive child with a minimal expenditure of time and effort, but it requires the cooperation of both the pa-

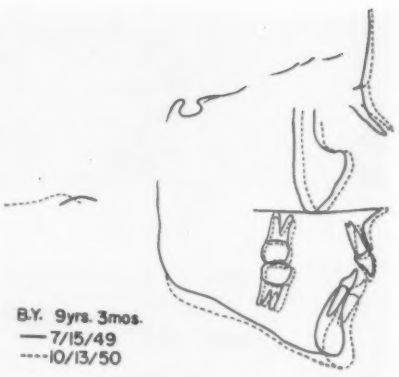


*Fig. 8 • Tracing indicating change of position of incisors of patient shown in Figure 6*

17. Hedges, R. B. Change in molar relationship in Class II division I treatment. Angle Orthodont. 18:45 (Jan.-April) 1948.

18. Oppenheim, A. Biologic orthodontic therapy and reality. Angle Orthodont. 5:159; 5:233, 1935; 6:5 (Jan.); 6:69 (April); 6:153 (July) 1936; 7:58, 1937.

19. Kloehn, S. J. Guiding alveolar growth and eruption of teeth to reduce treatment time and produce a more balanced denture and face. Angle Orthodont. 17:10 (Jan.-April) 1947.

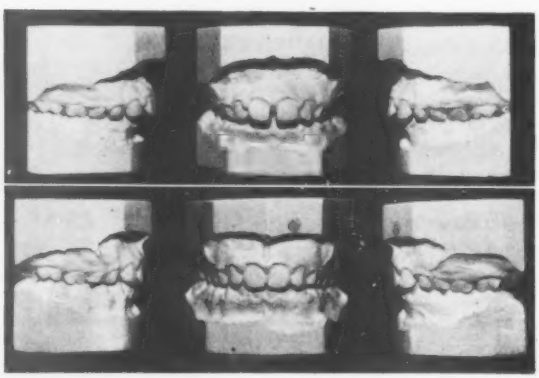

*Fig. 7 • Models of dentition of patient shown in Figure 6. Protrusion has been reduced by use of occipital force*

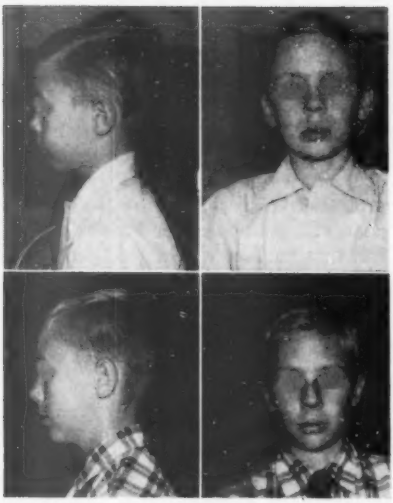

*Fig. 9 • Patient with retrusive occlusion*

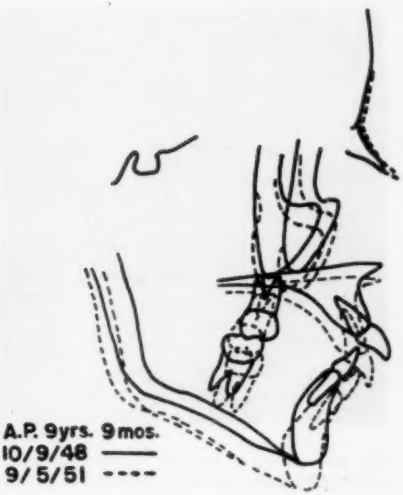


*Fig. 11 • Tracing showing changes which took place in the face of patient shown in Figure 9*

tient and the parents. Bands are adapted to the maxillary first permanent molars. To these are attached large round buccal tubes which have an inside diameter of at least .045 of an inch. A removable arch of the same diameter is adapted to slide through these tubes. To this arch is attached an outer face bow which in turn receives force from the occipital area by means of elastic traction (Fig. 4). Originally the occipital anchorage was obtained by means of a cap fashioned around the head. Various modifications have been developed and now the most satisfactory means appears to be a strap made of garter elastic (Fig. 5). The entire arch and face bow may be removed by the patient and is worn only

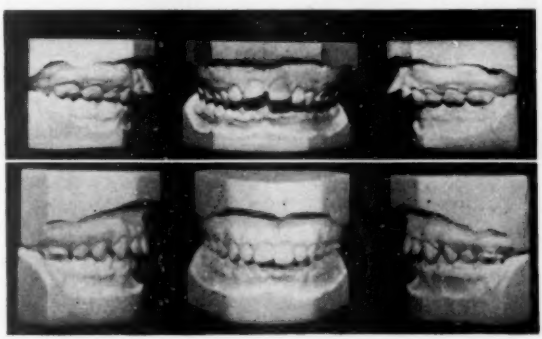

*Fig. 10 • Models of dentition of patient shown in Figure 9. Change in molar relationship is shown as well as reduction in incisor protrusion*

*Fig. 12 • Patient showing acceptable result attained by use of occipital anchorage*

while sleeping. At first the occipital traction is used to close abnormal spacing of the anterior teeth after which pressure is placed against the first permanent molars by placing stops on the arch wire to contact the buccal tubes. The ultimate effect seems to be one in which the maxillary denture is held relatively stationary in an anteroposterior plane of space while the remainder of the face grows downward and forward. This has been demonstrated by the work of Epstein.[20]

Figure 6 shows a 9 year old girl with a normally growing face. Through the misuse of her labial musculature a protrusion of her upper incisors was becoming progressively worse. Occipital anchorage was instituted to reduce the protrusion (Fig. 7). Figure 8 shows the change in position of the incisors and the fact that the face was in good proportion from the start and growing normally. This was a simple situation since there were good facial proportions and balance. She should now attain full normal growth.

Figure 9 shows a true developing retrusive face. This patient has been growing very slowly and is still under treatment. Figure 10 shows the definite change in the molar relationship as well as the considerable reduction of the incisor protrusion. As the remaining lower deciduous molars are exfoliated, the crowding of the lower anterior region should be reduced by action of the inclined planes. Figure 11 shows the change that has taken place in the face. This face will

20. Epstein, W. N. Analysis of changes in molar relationships by means of extra-oral anchorage (headcap) in treatment of malocclusion. Angle Orthodont. 18:63 (July-Oct.) 1948.

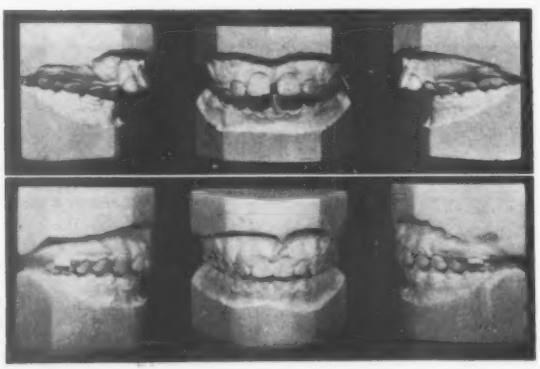

*Fig. 13 • Models of dentition of patient shown in Figure 12. Transition from a Class II occlusion in the mixed dentition to an acceptable Class I occlusion in permanent dentition is shown*

never develop to the point that it will be considered ideal but there has been considerable improvement. If the ultimate occlusion as a result of occipital anchorage therapy is not acceptable, at least the amount of orthodontic correction necessary will have been reduced to a minimum.

Figure 12 shows a face in which an acceptable result has been attained by occipital anchorage and no further orthodontic therapy is anticipated. Figure 13 shows the transition from a Class II, or distoocclusion, of the mixed dentition to a Class I acceptable permanent dentition. Evidence of the change in the relation of the maxillary teeth to the basal bone of the maxilla is shown in Figure 14. Subjective observation indicates that a change will occur when full cooperation of the patient is obtained. Cooperation, therefore, becomes a primary requisite in this form of guidance therapy.

*Fig. 14 • Tracing showing change in relation of maxillary teeth to the basal bone of the maxilla of patient shown in Figure 12*

SUMMARY

1. Faces and dentitions grow and develop along certain morphogenetic patterns.

2. The great majority of malocclusions are of hereditary origin.

3. Only a small portion of malocclusions are completely preventable by the application of local therapy.

4. Guidance of the erupting dentition by means of occipital anchorage may lessen the severity of the ultimate malocclusion.

*Con Amore* • I recall the story of a group of Italian painters who formed themselves into a guild and adopted the motto "Con Amore" meaning "With Love." They painted for the love of painting . . . and people marvelled at the finish and the glory of their masterpieces. Could we as dentists not take such a motto to heart and practice dentistry "Con Amore?" *M. H. Garvin, Journal of the Canadian Dental Association, May 1952.*

# Splinting: theory and practice

*Marvin Simring, D.D.S., Brooklyn, N. Y.*

Splinting, the binding together of teeth for mutual support, has stood the practical test of time for 45 centuries. In order to reap the fullest benefits, however, and avoid the possible pitfalls in splinting, the biomechanics of its operation must be understood, especially the immediate effect of pressure on the teeth.

## MOVEMENTS OF TEETH UNDER OCCLUSAL LOAD

Stuteville[1] sectioned the jaws of freshly killed dogs and monkeys and took motion pictures through a microscope as the teeth were pressed buccally and lingually. One root was left embedded completely and the other was sectioned buccolingually. He reported as follows:

> It was observed that the one-rooted teeth moved with their point of least movement or fulcrum at the junction of the apical one-third with the crown two-thirds of the root. . . . In multi-rooted teeth, the center of rotation is in the alveolar septum. When a lower molar is tipped mesially, the mesial root is pressed into the alveolus, and the distal root is elevated.

This, in essence, is the basis of splinting, for it transforms several single-rooted teeth into a new multirooted "super-tooth" whose roots do not individually tilt, but are rather pressed into the alveolus, or elevated.

Stuteville[1] further stated:

> When the tooth is pushed into its alveolus, as in mastication practically two-thirds of the [periodontal] fibres resist the movement (excluding the apical group and free gingival group). When the tooth is tipped the greatest pressure is brought to bear upon a small area of fibres at the crest of the side of force and on the opposite side of the apex. . . . It is obvious that more fibres are tightened in bodily movement than in tipping movement; therefore more force can be used safely.

Thus splinting appears to be the rational safety procedure to employ when a tooth must withstand forces beyond its individual physiologic limit. The pathologic tilting of the individual tooth is transformed by splinting into a physiologic bodily movement analogous to the bodily movements of the roots of multirooted teeth. Individual tooth movement is not obliterated by splints and fixed appliances as some have thought.[2] On the contrary, it is directed so that the entire periodontal membrane is stimulated fairly uniformly. Thus splinting is a biologic procedure.

Since a splint distributes the supporting force of the tooth more uniformly, there will not be as much movement by any one part of the tooth's supporting periodontal membrane as there had been prior to splinting. Therefore the tooth will appear tighter after splinting.

Presented in a symposium before the Section on Periodontia combined with the Section on Operative Dentistry, ninety-second annual session of the American Dental Association, Washington, D. C., October 17, 1951.

1. Stuteville, O. H., Orthodontia studies. Northwestern Univ. Den. Res. & Grad. Quar. Bul., May 6, 1935.

2. McCall, J. O., and Hugel, I. M. Movable-removable bridgework. Brooklyn, Dental Items of Interest Pub. Co., 1950.

The general biologic principles of splinting are:

1. Reduction of periodontal strain and tightening of teeth.
2. Physiologic re-orientation of tooth movements from pathologic tilting to stimulating vertical bodily resistance.

### RESISTANCE TO MESIODISTAL TILTING FORCES

The splint effect occurs through use of any appliance which ties several teeth together rigidly. A mesiodistal force applied to a splint or stationary bridge will act like force M in Figure 1. It will tend to rotate the entire unit of teeth and appliance about an axis (m) running between the teeth (at right angles to the force initiating the movement). The individual roots cannot tilt as separate units but must move more vertically and bodily. This utilizes the maximum stabilization available through splinting in resisting forces that tend to tilt teeth mesiodistally.

### DISTAL ABUTMENTS

The distal tilting force of a free end saddle partial denture may be periodontally pathogenic for a bicuspid to which it is clasped. That force might be oriented physiologically if the bicuspid were splinted to the tooth mesial to it.

### CANTILEVER BRIDGES

Vertical occlusal pressure falling outside the long axis of the tooth induces tilting similar to that resulting from horizontal (mesiodistal) strain. To prevent this, splinting can be utilized to support some cantilever bridges. Thus a missing second molar can be replaced with a small artificial pontic supported by a splint-bridge attached to the first molar, second bicuspid and first bicuspid.

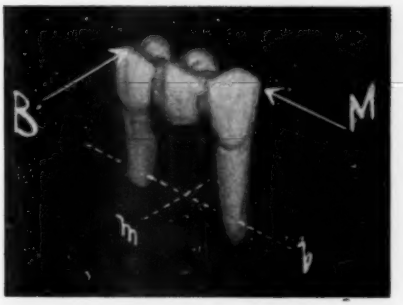


*Fig. 1 • M indicates mesiodistal forces; dotted line "m" indicates axis between the teeth; B indicates buccolingual forces; dotted line "b" indicates axis which runs through both teeth*

### RESISTANCE TO BUCCOLINGUAL TILTING FORCES

A buccolingual force (force B in Figure 1) tends to tilt the splint in a buccolingual direction about an axis of rotation (dotted line b) that runs mesiodistally through both teeth. The resulting tilt is essentially the same as the tilt of unsplinted teeth. There is, of course, the mechanical advantage of having the strain shared by two teeth; however, the unhealthy distribution of forces apically and cervically still exists and there is not the mechanical uniformity of stress distribution found in the splint's resistance to mesiodistal tilting. Thus the splinting effect is least in its resistance to buccolingual loads. This may be counteracted to some extent by a partial denture with a rigid bar which would pit the left and right splints against each other.

### BUCCOLINGUAL DIAMETER OF TEETH

In order to enhance the splint's reduction of occlusal trauma in the buccolingual direction other technics for the alleviation of traumatic occlusion should be utilized. The splint restorations should be narrow buccolingually in order to reduce the torque resulting from occlusal forces

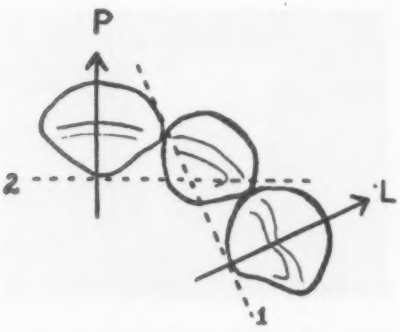


*Fig. 2 • P and L are labiolingual forces; 2 and 1 indicate axes*

which fall outside the long axis of the tooth.

Naturally, complete occlusal equilibration should always be instituted before splinting is undertaken.

### SPLINTING AROUND THE ARCH

Since occlusal forces are multidirectional (mesiodistal and buccolingual), an ideal splint would have to run not only mesicdistally but also buccolingually. Carrying the splint around the curve of the dental arch approaches this ideal of multidirectional splinting, of having the occlusal stress applied in the direction of the splint rather than at a right angle to it. In Figure 2 labiolingual force P falling on the central incisor tends to rotate the splint labially about an axis (2) running labiolingually. Since the central incisor and cuspid are not in one labiolingual line the axis (2) cannot run through both teeth but is located between them. Thus simple individual tooth tilting is impossible and bodily movement of the roots results. The same analysis can be applied to labiolingual force L which tends to produce bodily movement by rotating the splint around the dotted line 1 as the fulcrum. Thus splinting around the arch has a distinct advantage over splinting teeth in a straight line.

### RESISTANCE TO ROTATION ABOUT THE LONG AXIS OF THE TOOTH

In certain periodontal conditions teeth may drift, elongate or rotate. After the teeth are realigned in the dental arch they may require splinting because of the diminished periodontal support. When the pathologic force causes rotation, as, for example, the rotation of the lateral incisor away from the central incisor as shown in Figure 3, the tooth may tend to move out again after realignment. The rotation may be considered analogous to a door swinging open. When it is closed it would be locked at the side which had opened the most and not near the hinges. Likewise, the rotated tooth, after realignment, is "locked" by splinting to the tooth from which it moved. In Figure 3 this would be the central incisor. If this support were considered inadequate because the central incisor was weak, then the cuspid might be included in the splint for added support just as a door may be immobilized by bolting it on both sides.

If the lateral incisor were splinted to the cuspid alone, it would be analogous to placing the door lock near the hinges. This lock could easily be forced. Figure 4 shows a rotated tooth which was realigned and erroneously splinted to the cuspid with three-quarter crowns soldered together. The tooth rotated out again.

The rule is: a rotated tooth, which is realigned and requires splinting, should be splinted to the tooth from which it has moved most; for greatest support it may be splinted to the teeth on both sides of it.

### DISTANCE AND THE SPLINTING EFFECT

The effectiveness of the splinting action in a mesiodistal direction results from the buccolingual direction of the axis of rotation, which obviously cannot run through both teeth simultaneously and

therefore cannot permit individual tilting of each tooth, but involves uniform movement of both teeth. When the teeth are further apart, the arc of this movement increases and induces a more nearly vertical resistance which is desirable. The farther apart the teeth are, however, the weaker the buccolingual splinting effect is because a slight tilt in one tooth will permit a large movement in the other as if one tooth were rotating about the other as a distant fulcrum. Thus the unifying or splinting action diminishes as a wider latitude of independent tooth movement is permitted by distant abutments. Therefore when three or more missing posterior teeth are replaced, the splinting effect must be increased by including at least three abutments when opposed by the natural dentition or a stationary bridge (Fig. 5).

### RIGIDITY AND THE SPLINTING EFFECT

"Restorations replacing three or more missing posterior teeth and employing only two abutments may be considered when the opposing denture is a tissue-borne removable appliance."[3] In this case the opposing dentition being more yielding, the forces of occlusion are low and therefore considerable splinting effect is unnecessary. Furthermore, the unyielding rigidity of the splint may be deleterious to the ridge underlying the removable denture.

Thus the decreased mobility of the splinted tooth may cause some difficulties. The greater rigidity of a splint may occasionally wreak havoc on a weakened op-

3. The construction of fixed bridges. Lederle newsletter. New York, Lederle Laboratories Division, American Cyanamid Co., 1951.

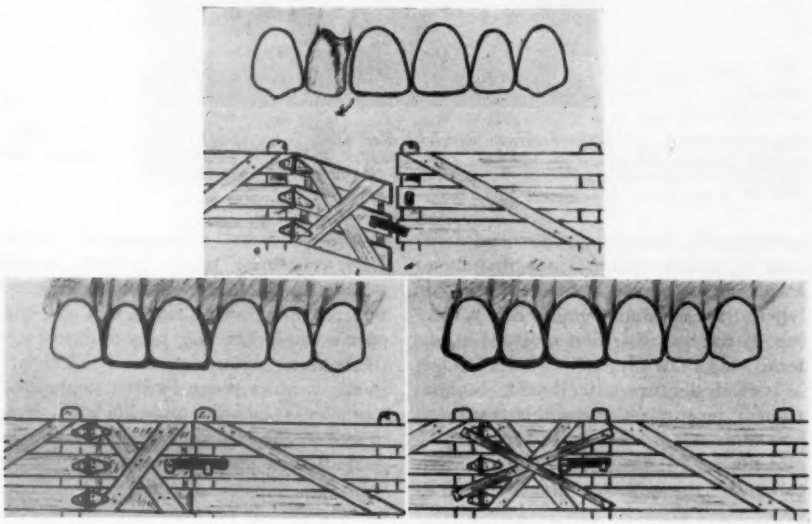

*Fig. 3 • Above: A lateral incisor which has rotated away from central incisor because of periodontal disease. Below left: After lateral incisor is realigned, it may require splinting to central incisor to prevent it from drifting out again, just as a door must be locked at the part which has rotated most. Below right: For greater stabilization, the splint may include cuspid as well as lateral and central incisors. This is analogous to barring a door on both sides in addition to locking*

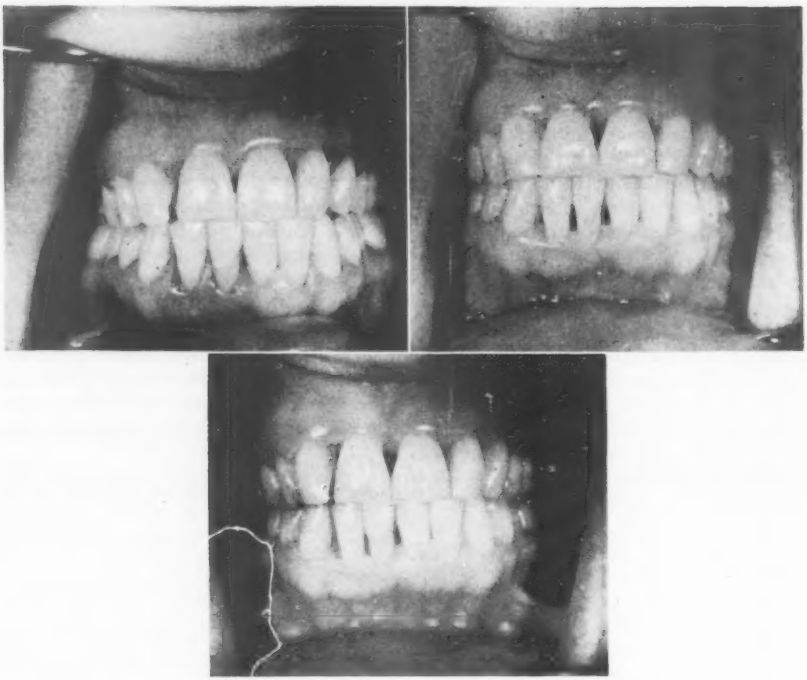

*Fig. 4 • Above left: Lateral incisor which drifted away from central incisor. Above right: Lateral incisor realigned with stainless steel ligatures. Below: Tooth splinted to cuspid with soldered three-quarter crowns. Slight rotation of lateral incisor is apparent*

posing tooth. For example, a second molar may be rigidly splinted to a first molar to prevent extrusion and food impaction where the opposing second molar is missing. If the opposing first molar is a lone tooth that must also support the load of a partial denture attachment, occlusal trauma may result upon this weakened first molar. It is wiser to extract the second molar if it interferes in any way or to extract the adjacent first molar if its prognosis is doubtful and replace it with a fixed bridge.

### THE PRACTICE OF SPLINTING

*Nonshrinking Waxed Silk Ligature*[4-6] • A double loop is tied around the first tooth and secured with a surgeon's knot. Each remaining tooth, in turn, is tied with a single loop secured at the next interproximal space with another surgeon's knot. On the proximal surfaces the ligature is placed so that it is gingival to the contact point (widest mesiodistal diameter); labially and lingually it is incisal to the cingulum (widest labiolingual diameter); thus the ligature is

4. Miller, S. C. Textbook of periodontia, ed. 3. Philadelphia, Blakiston Co., 1950, ch. 17.

5. Hirschfeld, L. The use of wire and silk ligatures. J.A.D.A. 41:647 (Dec.) 1950.

6. Sorrin, S. The use of fixed and removable splints in the practice of periodontia. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sec.) 31:354 (June) 1945.

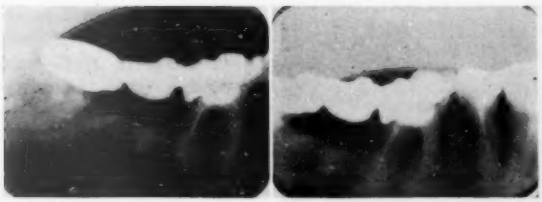

*Fig. 5 • Fixed bridge replacing second bicuspid and first and second molars attached with cast gold crowns to cuspid, first bicuspid and third molar (Sept. 27, 1947)*

*Showing improved health of alveolar bone (Dec. 30, 1950)*

secure. It cannot slip gingivally or incisally.

In order to avoid traction and possible drifting of the teeth where the teeth do not contact one another, a sufficient number of knots may be tied interproximally until the next adjacent tooth is reached. Instead of multiple knots, a single knot may be tied adjacent to each tooth and the interproximal ligature may be embedded in a small piece of quick-curing acrylic resin applied after the ligature has been completely tied. This will also add to the strength and security of the splint while simplifying its application.

Because of the absorption of food debris and saliva, the ligature tends to become fouled and may need to be changed every two weeks or more often. This absorption can be decreased and the durability increased by first painting the dried tooth surfaces with sandarac varnish and then, after tying the splint, applying a second coat of varnish.

Because all splints which the patient cannot remove may interfere with adequate toothbrushing, an advisable oral sanitation adjunct is a device for forceful water irrigation of the mouth, as suggested by Miller,[7] which may be attached to the faucet; for example, a commercial shower attachment.

While silk ligatures are rapidly and easily applied, their durability and rigidity are low. Furthermore ligation is generally limited to the six anterior teeth because of their anatomy. Posteriorly, the anatomy of the teeth permits the liga-

7. Miller, S. C., Oral diagnosis and treatment planning, ed. 1. Philadelphia, Blakiston Co., 1936, p. 256.

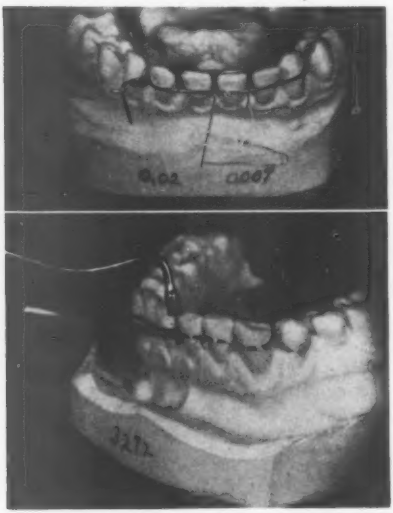

*Fig. 6 • Above: Arch or circumferential wire, 0.020 inches diameter, secured with interdental wires of finer gage, 0.007 inches diameter. Below: Arch or circumferential wire consisting of two strands of 0.010 inches stainless steel ligature*

ture to slip gingivally so that the splint is loosened and may irritate the gingiva. Ligature may be used, however, for splinting posterior teeth when the necks of the teeth are constricted or the roots are heavy.

*Indications* • Silk is valuable as a splint when it is required only for a matter of weeks in order to:

1. Stabilize a tooth with acute pericementitis.
2. Stabilize a tooth loosened by a blow.
3. Stabilize loose teeth in order to avoid undue injury or discomfort to them caused by instrumentation, periodontal surgery or grinding to relieve occlusal pressure.
4. Stabilize teeth during periodontal treatment in order to promote healing and possible reattachment of the supporting tissues.
5. Stabilize teeth until a more permanent type of splint is constructed.
6. Stabilize teeth with questionable prognosis until the results of treatment indicate whether the tooth may be retained.
7. Stabilize, following their repositioning, teeth which had migrated, rotated or extruded as a result of periodontal disease.

These may also be considered for all temporary splints. The type chosen depends on the following factors: simplicity of application, durability required, rigidity required, location, esthetics, oral sanitation and patient cooperation.

*Wire Ligature*[4-6, 8-10] • Wire ligature, like silk ligature, is limited generally to the anterior teeth for anatomic reasons. It is stronger than silk but takes longer to apply. It is more durable than silk and may even be retained for several years of treatment and observation. Wire ligature is not esthetic, however, and while it does not absorb fluids it tends to catch food particles and is difficult to keep clean. Accidental breakage or untwisting of the wire may expose sharp edges which irritate the lips, cheeks, tongue and gingiva.

Various types and gages of wire have been suggested in the literature. A dead soft stainless steel ligature either 0.020 inches in diameter (Fig. 6, above) is satisfactory, or where greater flexibility and ease of application are needed, two strands of 0.010 inches as the arch wire (Fig. 6, below). Interdental wires are 0.007 inches in diameter. The arch wire is looped around all the teeth to be included in the splint, roughly adapted to the teeth, and the ends are twisted together lightly. Like silk ligature, the steel is kept gingivally to the contact point

8. Rhein, M. L. Splinting loosened teeth in pyorrhea alveolaris. D. Cosmos 45:369 (May) 1903.
9. Smith, R. Construction of a splint in periodontal treatment. D. Digest 47:118 (March) 1941.
10. Barkann, L. The case for metal ligatures in periodontia. J. 2nd Dist. D. Soc. (N.Y.) 31:341 (Dec.) 1945.

and incisally to the cingulum. Strands of the thinner gage wire, about one and a half inches long, are bent like hairpins with one arm longer than the other. Each interdental "hairpin" is inserted from the lingual side with the longer arm gingival to the arch wires and the shorter arm between the arch wires and the contact point. Using a hemostat or fine beaked pliers, each interdental wire is twisted tight clockwise. Overtwisting will cause breakage. The ends of all the wires are then cut, leaving about 3 or 4 mm. of the twisted ends sticking out. These are then curled around the end of a broken instrument with an amalgam plugger. The instrument is withdrawn and the little loop of wire is then tucked, with the plugger, into the interproximal embrasure to avoid soft tissue irritation. Should the splint become loose at any time, these little wire loops may easily be tightened.

The arch wire frequently slips incisally off the distal aspect of the cuspids because of an open contact or because the tooth is conical in shape. This slipping may be prevented by a cervical retaining wire loop as described by Hirschfeld.[5] A piece of thin gage wire is placed around the neck of the cuspid or around the neck of the first bicuspid (Fig. 6, below), if the cuspid is too conical to retain this wire, and drawn tight with about three twists. One strand is now placed under the arch wire on the distal aspect of the cuspid and the other strand of the retaining loop is placed over the arch wire and then both strands are twisted together enclosing the arch wire. The twisted end of the retaining wire is cut short and curled away interproximally.

The taut wires may tend to draw the teeth together into the smallest possible arc. Therefore, where the teeth are not in contact mesiodistally, the interdental space may be taken up by twisting the arch wires together to bridge the space or, as with the silk ligatures, a small piece of quick-curing acrylic resin can be placed to bridge the space between two teeth, enveloping the arch wires.

*Fig. 7 • Extradental acrylic resin splint applied directly between the teeth while tooth-colored acrylic resin is soft*

The wire splint's poor esthetics and its possible irritation to the lip may be overcome by applying a thin layer of tooth-colored quick-curing acrylic over the labial arch wire after the splint is completed. The shadow of the wires may be obscured by first painting them with an opacifier paste made of light yellow zinc oxyphosphate cement powder plus a few drops of the acrylic monomer, and then applying the freshly mixed acrylic resin.

The self-curing acrylic resins may also be used so as to permit the use of wire ligature splints posteriorly. After the application of the double-strand arch or circumferential wire, it is secured in place with small plugs of the self-curing acrylic resin placed in each interproximal embrasure, buccal as well as lingual, engaging and enclosing the arch wire. Once these plugs set they will prevent occlusal or gingival movement of the arch wires. If there is a tendency for the arch wire to slip gingivally during its application it can be secured with separate strands of wire which run from buccal to lingual across the occlusal surface. Both buccal and lingual strands of the arch wire are engaged and are drawn taut. These accessory buccolingual wires may be cut off after the arch wire has been secured with the proximal acrylic plugs.

*Extradental Plastic* • A method recently advocated by Sorrin can be used where there is adequate space between the lower incisors (Fig. 7). Tooth-colored quick-

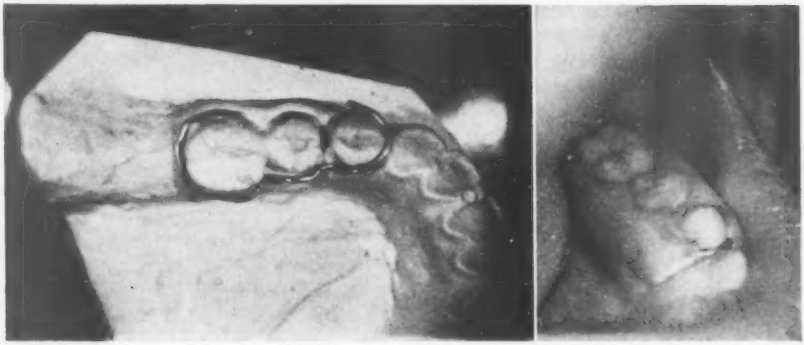

*Fig. 8 • Left: Stainless steel wire, 21 gage, adapted to stone cast. Self curing acrylic resin is processed over this. Right: Completed surgical apron-splint in place in patient's mouth*

curing acrylic resin is freshly mixed and formed into a strip which is placed lingually and pushed labially through the interdental spaces. A labial core of impression compound might be made initially to stabilize the teeth during the procedure. Unfortunately, this esthetic, stable, and simply applied splint can be removed only by grinding it off.

*Intradental Plastic* • Obin and Arvins[11] advocate a highly esthetic, fairly stable method of temporary splinting which is of value where a more permanent restoration will be indicated if the teeth can be retained.

After the teeth are ligated with dental floss for stability, a plaster or compound core is made and then an undercut groove is prepared in the teeth (lingually in anterior teeth; occlusally in posterior teeth) and this is packed with self-curing resin which is held in place by the core until it has set.

According to Obin and Arvins, superior marginal adaptation can be obtained by making individual mesiolinguodistal restorations in self-curing acrylic resin for each tooth and then uniting them all with more of the resin.

*Soldered Bands*[6] • Each tooth is banded and the individual bands are soldered together and cemented to place. This is used frequently to provide the resistant force required for moving teeth orthodontically. It is unesthetic but provides good stabilization, although bands do occasionally loosen because of occlusal pressure. Excellent contouring is essential to avoid gingival irritation and dental caries.

*Removable Cast Metal*[6,12] • A continuous cast clasp splint, as advocated originally by Miller,[4] which encircles the teeth at their heights of contour buccally and lingually can be cast in gold or chrome-cobalt alloy and affords an excellent temporary splint. Interference with occlusion must be avoided. They are more rigid than ligatures and may be removed by the patient for cleaning. Esthetically, however, they are poor.

The continuous clasp splint is frequently used as part of a removable par-

11. Obin, J. N., and Arvins, A. N. The use of self-curing resin splints for the temporary stabilization of mobile teeth due to periodontal involvement. J.A.D.A. 42:320 (March) 1951.

12. Schweitzer, J. M. Oral rehabilitation. St. Louis, C. V. Mosby Co., 1951.

tial denture so that the splinting effect of multiple abutments may be utilized for the support of artificial teeth and, occasionally, to support some weak natural teeth at the same time. The splinting effect may be enhanced by incorporating into the appliance, attachments which fit rigidly into slots in inlays or crowns on the teeth. Precision attachments or precision lugs resting in precision lug seats are thus of great value. In order to attain optimum efficiency in the removable denture-splint by carrying the splinting effect around the arch, a rigid bar is essential.

*Removable Plastic Splints*[4,6,13] • The esthetic disadvantage of the cast metal removable splint can be overcome by the use of methyl methacrylate resin. This simple, inexpensive, esthetic splint is weaker and bulkier, however, than the all-metal continuous clasp splint. On a cast of the patient's mouth, a 21 gage stainless steel wire is contoured around the teeth above the widest portion of the tooth. In making an anterior splint the wire would be limited to the lingual surfaces and the distal half of the labial surfaces of the cuspids. Transparent acrylic resin is then processed labially and lingually with the wire embedded at all points except at the distal ends of the splint where it passes interproximally. Thus the splint can be removed by the patient for cleaning. Occlusion must be checked carefully. The splint should be constructed so that it does not engage deep undercuts on the teeth since repeated withdrawal and insertion by the patient might prove traumatic and the salutary splinting effect would be negated.

Self-curing acrylic resin also can be used. It is neither as strong nor as dense as the regular heat-cured methyl methacrylate resin. Figure 8 shows wire which has been adapted around the teeth of the patient's study cast. The acrylic resin was then placed over it. The resin was extended over the gingiva to form a surgical apron. In this instance the second bicuspid was so mobile that it could be depressed in its socket. The depth of the pockets mesially and lingually are shown in Figure 9, above. After thorough conservative periodontal treatment, a flap operation was performed lingually in the bicuspid first molar region. The flap was held in place by the surgical apron-splint without the interference of sutures. Thus both dental and periodontal tissues were

13. Sorrin, S. Acrylic splints for loose teeth. N.Y.U. Periodontia Bull., Feb. 27, 1942.

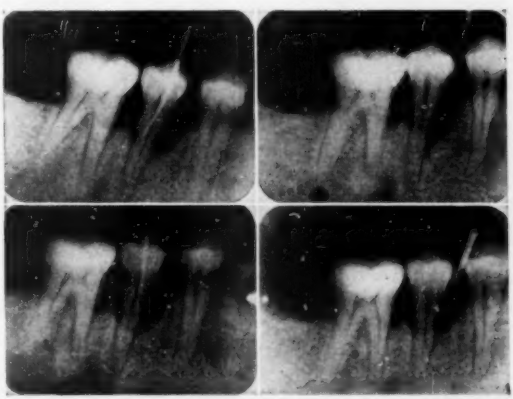

*Fig. 9 • Upper roentgenograms made before periodontal pocket treatment. Gutta-percha points indicate depth of pockets. Lower left picture was made 10 weeks later; lower right figure was made seven months later*

immobilized. After six weeks the gingival apron portion was cut off and the patient used the appliance for an additional month as a removable splint. The present excellent state of periodontal healing is indicated in Figure 9, below. At this time the lingual gingival sulcus was only 1 mm. deep and could not retain a gutta-percha point. Mobility was only slightly greater than normal.

*Interlocking Inlays* • An interlocking inlay-splint consists of an inlay with an extension that fits snugly into a slot in an inlay on another tooth. The interlocking inlay-splint is effective to the extent that the two inlays are rigidly connected. Thus the male part should be long and both parts should fit tightly. The lateral splinting effect is diminished if lateral play is permitted between the inlays. The male restoration must cover the entire occlusal surface of its tooth since the male inlay is held in place by the female inlay and an uncovered occlusal area would permit the tooth to be depressed in its socket and be detached from the male inlay.

Resistance to vertical occlusal pressure is poor in the female section of this splint. Thus the interlocking inlay provides incomplete splinting. Its only indication might be the rare case in which parallelism prohibits the use of a soldered joint between restorations.

*Stationary Splints*[4,6,14] • The stationary splint composed of several three-quarter or full cast crowns or other type of full coverage soldered together is the most durable and efficient splint.

Since the splint and teeth are relatively unyielding, considerable internal strain develops within the individual abutment restorations. Smyd[15] has shown that a simple MO or MOD inlay may spread as a result of these tensions. The buccal and lingual "bands" of crowns prevent this spread and avoid possible leaks, loosening of the splint and caries under the restorations.

Furthermore, full occlusal coverage is essential. Since the splint is unyielding and is rigidly attached to several teeth, it may separate from one of the teeth if occlusal pressure, falling on the tooth surface and not on the splint, depresses that tooth slightly within its alveolar socket and away from the splint.

For these reasons, cast crowns are advocated for stationary splints posteriorly and ordinary inlays are contraindicated. Three-quarter crowns may be used in a mouth that is caries resistant, where the teeth to be splinted "present good vertical length since the retention of this attachment is dependent on long grooves. Where short teeth are to be splinted, full crowns, with or without acrylic veneers, are indicated."[16] For anterior teeth, three-quarter crowns or thimbles and porcelain jackets or, where the occlusion is heavy, full castings with porcelain or acrylic resin facings may be employed.

The soldered joint between the crowns must be rigid and must be placed close to the occlusal area so the gingival tissue is not impinged on and so adequate oral sanitation is possible. The soldered joint must be fully rounded occlusally and gingivally; narrow capillary spaces which would trap food and saliva must be avoided.[17]

Diligent home care by the patient is essential where splinting is utilized. The use of a rubber interdental stimulator is indicated where there is gingival recession interdentally. A modified Stillman's method of toothbrushing should be supplemented by the modified Charter's method of toothbrushing in order to cleanse and stimulate the interdental re-

14. Kabnick, H. H., and Elson, M. Prosthetic aid employing fixed bridges and splints in periodontally involved teeth. Alpha Omegan 44:85 (Sept.) 1950.

15. Smyd, E. S. Dental engineering as applied to inlay and bridge fabrication. New York J. Den. 21:161 (April) 1951.

16. Miller, S. C. Textbook of periodontia. Philadelphia, Blakiston Co., 1938, p. 471.

17. Gottlieb, B., and Orban, B. Zahnfleischentzündung und Zahnlockerung. Berlin, Berlinische Verlagsanstalt, 1933, p. 280.

*Fig. 10 • Precocious advanced alveolar atrophy with pockets involving trifurcations of upper molars and bifurcation of lower left first molar in 23 year old man*

gions adequately. An excellent device for oral hygiene is the patient's use of water irrigation as previously suggested. Regular professional dental prophylaxis three times a year is essential.

Because of the difficulty of proper oral sanitation and dental instrumentation in the second and third molar interdental region, splinting is generally avoided between these teeth.

Esthetics occasionally demand the use of a splint composed of individual porcelain jacket crowns cemented over gold-thimble copings soldered together. Cleansability, gingival stimulation, and freedom from gingival irritation are more difficult to attain with porcelain jackets than with gold cast crowns faced with acrylic resin or porcelain.

Where porcelain jacket splinting is used, some type of temporary splinting is indicated during the interval between tooth preparation and insertion of the completed splint. If temporary clear acrylic resin crown forms are used, these may be joined with a little of the self-curing acrylic resin placed at the linguo-interproximal points. This type of splint can also be used where teeth are prepared for three-quarter crowns.

An alternate procedure consists of taking an impression with alginate impression material before the restorative preparations are made and setting this aside until the preparations are completed. Then self-curing acrylic resin is mixed and placed into the impression in those teeth that have been prepared. The impression is then re-inserted, held in place for three to five minutes, and withdrawn before the resin has become completely hard. It is permitted to bench-harden. Then it is removed from the impression, trimmed, polished, and inserted with a temporary cement such as zinc oxide and eugenol. Similar temporary crowns for adjacent teeth can be prepared and fused to the first ones if additional teeth are prepared at a later time.

Stationary splints are indicated where the maximum splinting effect is essential in order to retain teeth because of the large amount of bone loss or because the teeth have a tendency to drift. Although splinting will aid teeth in withstanding a normal functional occlusal load which might otherwise prove traumatic to them, Coolidge and Hine[18] state: "There must be at least one-third of the root surrounded by tissue that gives

18. Coolidge, E. D., and Hine, M. K. Periodontia; clinical pathology and treatment of the periodontal tissues. Philadelphia, Lea & Febiger, 1951, p. 209.

*Fig. 11 • Healing of periodontal tissues 18 months later*

clinical evidence of health and firmness." Thus pathosis must be eliminated and a careful diagnosis made before stationary splinting is undertaken.

The cast crown stationary splint also may be used for teeth that must withstand an occlusal load greater than normal. This is accomplished by using multiple abutments for fixed and removable prostheses. According to Kabnick and Elson,[14] "Bone support for two-thirds of the root length is the minimum amount necessary for a single abutment tooth." Therefore multiple abutments must be utilized in many cases where periodontal disease has been present. The excellent healing of the bone which follows such treatment is shown in Figures 10 and 11. Three of the first molars had clinical involvement of the root bifurcation. They were extracted and, following conservative periodontal treatment, were replaced with three fixed bridge-splints attached to both bicuspids and the second molar. The periodontal improvement is apparent in Figure 11.

When collapse of the maxillomandibular vertical dimension has occurred because of extreme wear or drifting of the teeth, the restoration of the lost vertical dimension to its normal height ("bite-raising") frequently increases the periodontal strain by increasing the extra-alveolar lever arms of the teeth. Stationary splinting is indicated to prevent the periodontal disease that may be the aftermath of increasing the height of the crowns of the teeth.

Thus splinting is indicated where the traumatic effects of occlusion are intense and the stimulating physiologic action of occlusal force needs to be improved. It follows that wherever splinting is indicated, thorough occlusal equilibration is indicated first. Furthermore, the restorations involved in the splint itself must fulfill the requirements of occlusal equilibration and harmony with the patient's dentition and temporomandibular joint function.

## SUMMARY AND CONCLUSION

Splints are of value in supporting loose teeth, weakened teeth and strained abutment teeth. Splints divide occlusal strain over several teeth and direct it physiologically. Although the most effective splinting is attainable only with cast crowns soldered together, there are many indications for the various types of temporary splints. Splinting may be considered to be an adjunct in the treatment and prevention of occlusal trauma.

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# Partial denture and its relation to periodontics

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The number of people who lose their teeth in this modern age is incredible. It has been passed down from generation to generation that it is natural to have teeth extracted and dentures constructed. Since our grandparents had dentures, we, too, shall have dentures before we die. The prevalence of this line of reasoning is proof that the dental profession is guilty of gross neglect in its failure to educate the public; busy dentists have not taken time to instruct their patients properly in the prevention of dental caries and periodontal disease so that the natural dentition may be retained.[1] It is unreasonable that people should lose their teeth and become denture patients dependent on the mechanics of the dental profession. With the advanced methods of treatment by the periodontist, with the aid of proper mechanical replacements and with the present knowledge of dental medicine, one should retain his teeth throughout life.

## ECONOMIC ASPECT

It is true that the greater part of the dentist's income comes from reconstruction work and not from demonstrations of the many procedures a patient can use to keep his teeth in a healthy condition. Several lecturers on dental economics have agreed that the work a general dental practitioner does in his office reviewing mouth hygiene and proper diet, giving a prophylaxis and correcting faulty occlusion accounts for only about 20 per cent of his gross income. The reason people lose their teeth is clear: dentists receive 80 per cent of their income from restoring mouths and only 20 per cent from preventing the need for restorative dentistry. It is high time for dentists to change this situation. Preventive service in dentistry must become just as remunerative as restorative service. Then, dentists could and would spend more time in preventive service; and patients would retain their teeth at considerably less expense and discomfort.

The question arises: why should one retain his teeth when the refined foods we thrive on today can readily be consumed with mechanical substitutes. The answer is obvious: in the first place because dentists, using the substitutes they are capable of constructing, have not been able to compete with nature. Well do they know that the efficiency of a natural denture is far greater than that of an artificial one, that natural teeth properly cared for are unlikely to be foci of infection and make for better health

Presented before the Section on Partial Denture Prosthesis combined with the Section on Periodontia, ninety-second annual session of the American Dental Association, Washington, D. C., October 17, 1951.

1. Bunting, Russell W. Preventive dentistry. (Abst.) D. Cosmos 59:257 (March) 1917.

than artificial ones and that a good healthy natural dentition affords more happiness than any mechanical appliance ever constructed.[2]

## RECONSTRUCTION versus PREVENTION

For the good of humanity, dentists should inform the public that care of the teeth by a dentist must start early in life not only to prevent the necessity of mouth reconstruction but also to avoid the expense of such dental service. The history of the tooth is ever the same: it is filled several times, then crowned, later extracted, then replaced with a bridge; the bridge abutments finally deteriorate and the process continues to a partial denture and all too often to a full denture. All this is done at considerable expense. In order to retain natural dentition, it is necessary to redirect the expense from reconstruction to preventive measures. This would mean that a dentist would spend more time educating patients, establishing better public relations, talking to civic clubs and composing articles for various lay periodicals.

An educational program should be developed to reach persons of all ages in every walk of life. Personal effort should be concentrated on diet[3] and mouth hygiene,[4] public effort on the fluoridation of communal water supplies. If dental education is begun at an early age and reinforced by a public caries-prevention program, dental disease will be reduced.

After the permanent teeth erupt, an extremely important factor in the prevention of dental disease is occlusion. Traumatic occlusion plays a part in practically all dental disturbances and should be corrected before any restorative work is done.[5]

## DIAGNOSIS

When a mechanical replacement becomes necessary for the retention of the remaining teeth, it should be constructed in occlusal harmony with them. Whether this appliance is fixed or removable in nature, all trauma in the occlusion should be eliminated; stabilization of the natural teeth must be the foremost consideration in its construction. It is the purpose of this paper to discuss the construction of partial dentures that aid in the retention of the natural teeth.

It is necessary to make a thorough study of each case to decide the type and design of partial denture indicated. Important factors are the patient's age, the possibility of further loss of teeth in the near future and the patient's ability to accommodate himself to a removable appliance. Casts of the case should be studied to determine how to parallel the teeth, if it is necessary, and to ascertain any undercuts that may be of value. Roentgenograms should be taken to determine the density of the bony foundation and the periodontal condition of the abutment teeth. All these are important diagnostic considerations.

## PARTIAL DENTURE DESIGNS FOR PARTICULAR PURPOSES

The tooth-borne partial denture is rarely indicated. When a partial denture of this type is used, the occlusion must be maintained in balance without trauma in any excursion. Such a restoration can have internal attachments or any of the various clasp designs. If an external attachment is used, however, the abutment teeth should be restored. This restoration should be so designed that the rest for the clasp is as far from the occlusal sur-

2. New York Academy of Medicine. Biological foundations of health education: proceedings of the Eastern States Health Education Conference, April 1, 2, 1948. New York, Columbia University Press, 1950.

3. Mendel, L. B. Nutrition: the chemistry of life. New Haven, Conn., Yale University Press, 1923.

4. Fones, A. C. Discussion of Mrs. T. Allen Ganung's The work of the dental hygienist regarding the prevention and control of pyorrhea alveolaris. D. Cosmos 59:215 (Jan.) 1917.

5. McCall, J. O. Effect of traumatic occlusion on dental and periodontal tissues. J. South. California D. A. 17:16 (July) 1950.

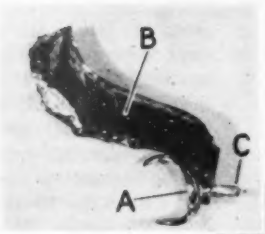
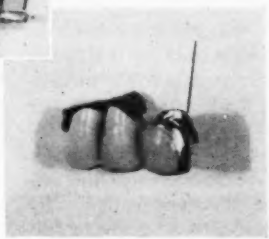



*Fig. 1 • Left: A, rest constructed on inside of clasp; B, palatal bar; C, stress-breaker to which substitute teeth are to be attached*



*Right: Seat for rest on clasp contacting abutment close to gingiva*

face as is possible, that is, as close to the gingival line as practical (Fig. 1). A rest placed close to the gingival line greatly reduces the leverage on the abutment teeth and stimulates the periodontal membrane of the abutment teeth. A partial denture of this type can be constructed only when the roentgenograms disclose a dense bony foundation with healthy periodontal membrane encircling the roots of the abutment teeth.

The tissue-borne partial denture is one of the most valuable both to the dentist and to the patient. This type is indicated when the abutment teeth are weak and there is a possibility of further loss of teeth. The denture can be constructed without wrought clasps. If it is necessary to use clasps, however, they should be removed after the patient has accustomed himself to the denture (Fig. 2). A partial denture of this type should be constructed with an increase from 1 mm. to 5 mm. in the vertical dimension to allow for its settling in the first six months of wear. If a patient has a limited number of teeth and the dentist feels sure they will be lost soon, it is ideal for the patient to wear a tissue-borne partial denture to which the remaining teeth can be added one at a time until the denture has become a full one. In such a case the patient is happier because the full denture is not entirely strange to him. Many teeth have been saved for years by the use of tissue-borne partial dentures, a most valuable type of construction for the dentist and for the patient.

For the best interest of the patient and for the long life of the remaining teeth, when posterior teeth are missing on one side of the jaw and a first molar and a second bicuspid are present on the opposite side, the missing teeth can be supplied by a palatal or lingual bar denture with precision attachments in the abutment teeth and a stress-breaker on the side of the free end saddles (Fig. 3, upper), that is, provided that the crowns of the teeth are long enough to accommodate precision attachments. In this case, the abutment teeth are anchored together with a resultant stabilizing of the arch and improvement in the periodontal condition of all the teeth including the abutments. By the use of a real stress-breaker, all torque and strain on the abutments are relieved, and the saddle area massages and stimulates the ridge (Fig. 3, lower).

As previously explained, it is not necessary to use precision attachments on the

abutments, for there are many types of anchorage which are satisfactory. The type of anchorage depends on the individual case and the dentist's preference.

### CONSTRUCTION TECHNIC

Since 1935 when Andy Sears presented to the profession the indirect technic in which hydrocolloid is used for taking the impression, it has been possible to construct completed dentures from a master cast. For a partial denture in which precision attachments, three abutment teeth and a free end saddle are used, the following procedure is recommended. The abutment teeth are prepared and a full hydrocolloid impression is taken. With a small syringe filled with the mixture, the hydrocolloid is injected around the abutment teeth. A tray filled with hydrocolloid is seated in the mouth, and the hydrocolloid in the tray unites with the hydrocolloid injected around the abutment teeth. In a similar way three small impressions, one of each abutment, are made so that the dentist will have three extra stone dies which have not been articulated, on which he can do his final marginal waxing. These hydrocolloid impressions are rinsed thoroughly and soaked for 30 minutes in a bath of potassium sulfate, 290 grains per quart of water. The bath of potassium sulfate hardens the surface of the hydrocolloid, creates a rapid setting on the surface of the stone when the cast is poured and prevents the powdered surface on the casts from causing an inaccuracy. The impressions are dried out with blasts of air, and a putty-thick mix of artificial stone is vibrated into the abutment teeth of the impression. These abutment teeth are built up in the stone long enough to have roots that can be keyed. After sufficient stone is vibrated into the abutment

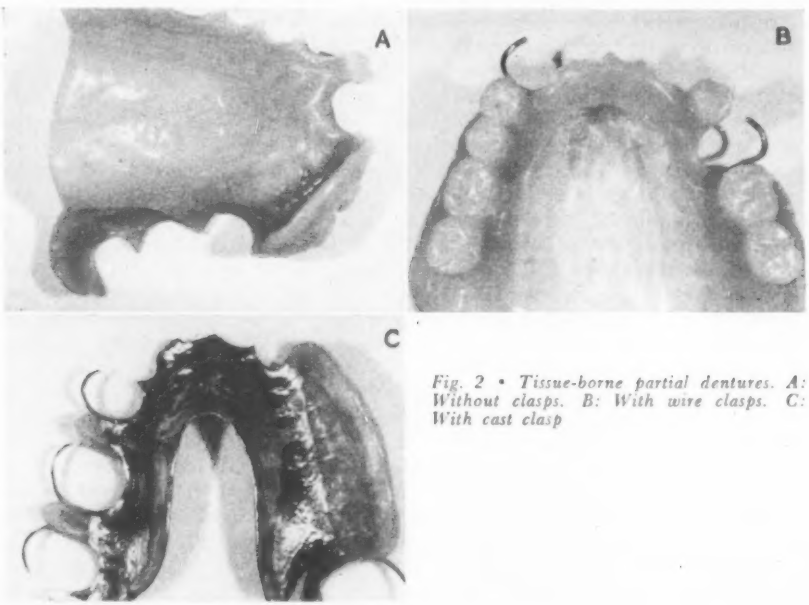



*Fig. 2 • Tissue-borne partial dentures. A: Without clasps. B: With wire clasps. C: With cast clasp*

teeth, the impressions are replaced in the potassium sulfate bath until the stone has set completely. When the stone abutment teeth have set, they are withdrawn from the impression; the impression is returned to the potassium sulfate bath. The stone dies are trimmed with roots shaped and keyed to seat and reseat accurately in the completed cast. For the purpose of hardening, these stone dies are placed in a bell jar for at least one hour under 29 inches of vacuum. At the end of an hour they are immersed in an oil bath of 100 viscosity, and the vacuum is immediately released so that oil replaces the water of crystallization removed under vacuum. This process not only hardens the dies but also prevents the wax pattern from sticking. These abutment dies are then replaced in the impressions, and the cast is poured in stone. The full cast is articulated with the opposing cast and mounted. The wax patterns are made partially on the articulated full cast and refined on the dies from the smaller individual impressions. The castings for the abutments are made and returned to the dies in the master cast. They must fit the dies accurately.

When precision attachments are used, recesses parallel to each other should be made in each casting. These recesses accommodate the female portion of the precision attachment. With the castings in place on the master cast, the female attachments are waxed in each abutment, a Chayes parallelometer being used to ensure that the attachments are parallel. Each abutment with the female portion of the attachment is invested, soldered and finished. The completed abutments are replaced on the master cast, and the

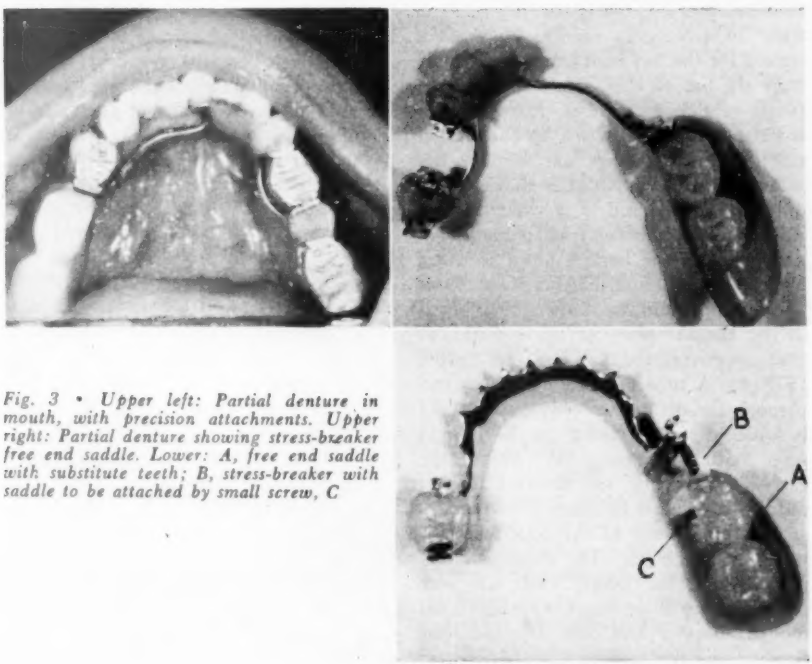



*Fig. 3 • Upper left: Partial denture in mouth, with precision attachments. Upper right: Partial denture showing stress-breaker free end saddle. Lower: A, free end saddle with substitute teeth; B, stress-breaker with saddle to be attached by small screw, C*

*Fig. 4 • Shafting soldered to contact plate of attachment*

male portion of the attachment with the contact plate is fitted into each abutment. With the attachments in place, an impression of the master cast is made and then an investment model. The cast is waxed for the bar with prongs extending from the bar on each side of the contact plates of the attachment. After the bar is cast, it is carried back to the master cast; and the prongs on the bar are soldered to the contact plate they engage; only one is soldered at a time. In this way all three abutment attachments are connected to the bar. A piece of distal extension casing and shafting is cut about ¼ inch long, and the shafting is soldered to the contact plate of the attachment that approximates the free end saddle (Fig. 4). A tube long enough to extend through the denture after it is completed is soldered to the casing on the lingual side. With the casing in position, the cast is waxed for the distal extension saddle; care must be taken that there is considerable bevel of the wax where it meets with the bar. The denture is removed from the master cast; the wax pattern of the distal extension saddle is removed, invested and cast. The saddle is finished and replaced on the master cast; a drill, the size of the tubing soldered to the distal extension casing, is inserted through the tubing; and a hole is made through the lingual side of the casing and completely through the shafting to the buccal side of the casing. This hole in the shafting is enlarged considerably to prevent the screw from impinging. The tubing is threaded with an .080 tap, and a screw is made which fits this tubing and passes through the shafting from a 15 gage wire. This screw retains the saddle. The amount and direction of movement of the saddle depend on the manner in which the shafting, or male portion of the stress-breaker, is ground. A stress-breaker that relieves the stress on all abutments is necessary in all cases where there is a free end saddle. In order for a stress-breaker to function in this manner and to be an aid to the stability of the remaining teeth, it must have freedom of movement in all directions and must be able to return to its original position without the aid of springs or any assistance other than the occlusion of the opposing teeth. This is the only type of stress-breaker that is an aid to the periodontist in his work.

Another type of partial denture that is of great value to the periodontist in his

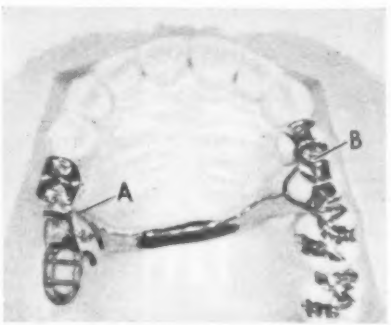



*Fig. 5 • Unilateral attachment in combination with stress-breaker; A, attachment; B, stress-breaker*

work is the unilateral partial denture which is constructed without using a detrimental attachment on the side where there are remaining teeth (Fig. 5). Too often the attachments on the side of the remaining teeth soon weaken these teeth so that the unilateral partial denture must be replaced by a bilateral partial denture. Retentive power is not necessary in a unilateral attachment; stabilization alone is sufficient. This can be gained by a simple lingual clasp that has two occlusal rests, one on the mesial marginal ridge and the other on the distal marginal ridge of the occlusal surface of either a bicuspid or a molar tooth. These two occlusal rests are connected by a casting to two 18 gage wires which extend into the mesial and distal embrasures of the same tooth (Fig. 6). The casting is constructed by drilling a hole with a no. 2 round bur in the embrasures at an angle of 45 degrees to the occlusal plane and then waxing an 18 gage wire in each hole. The cast is waxed for the occlusal rests and the remaining parts of the lingual clasps, and this pattern is cast to the wire pins. This is done on an investment cast made from an impression of the master cast. A bit of solder should be flowed in the spot where the casting and pins join. The attachment thus made is soldered to the bar. The pins are adjusted for correct length on the finished denture in the mouth. The substitute teeth must be supplied on a saddle which is attached to the bar by a stress-breaker.

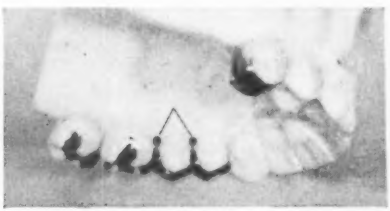


*Fig. 6 • Holes in cast for 18 gage wires*

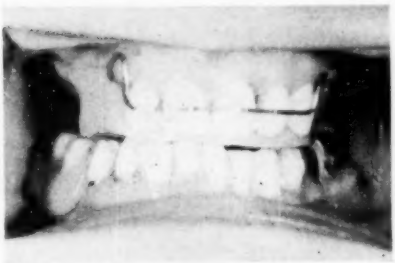


*Fig. 7 • Hawley appliance to wear at night to prevent tooth grinding*

Another appliance which is invaluable to the periodontist to help retain the natural teeth is not exactly a partial denture but what is called a Hawley retainer. This appliance was first conceived to retain the arch after the work on an orthodontic case was completed (Fig. 7). It is a valuable appliance for patients of all ages and particularly for a patient who has an overbite of any degree. It has been found that by wearing an appliance of this type at night, the chipping, wearing, loosening, much erosion and gingival sensitivity of teeth are eliminated provided that there is no trauma present in the occlusion when the appliance is not worn. This appliance prevents the patient from the common habit of grinding his teeth at night. Its use has preserved many teeth for years; it can be used unless the patient has an open bite. Patients with an open bite can wear posterior bite blocks at night.

## CONCLUSION

Properly constructed partial dentures are an invaluable aid to the periodontist, but they must be so made that they function independently of the remaining teeth and abutments. When a stress-breaker is used, it must have freedom of movement; tissue-borne partial dentures must be retained firmly in occlusion.

*914 Professional Building*

# Interrelation of local and systemic factors in periodontal disease: bone factor concept

*Irving Glickman, D.M.D., Boston*

Etiological factors in periodontal disease are considered traditionally as being either local or systemic; up to a certain point, this division is a reasonable one. Its purpose is to indicate differences in the effectiveness of various disease-producing factors; however, it has created an erroneous impression of independent action by local and systemic factors.

In this paper an attempt will be made to explain the causation of periodontal disease in terms of the interrelation of local and systemic factors as it is ascertained from microscopic tissue changes. It is convenient to describe etiological factors in periodontal disease under the two separate headings; but when an operator is confronted with a periodontal patient, he should remember that it is the interdependent action of local and systemic factors on cell physiology and cell morphology which is responsible for an altered clinical picture (Fig. 1). Though it may well be that in individual cases either the local or systemic factors exert the major deleterious effect, periodontal disease cannot be thought of as being either purely local or purely systemic in origin. Both local and systemic components are always present in periodontal disease, and it is the manner and degree to which each or both are altered that determines the initiation and course of clinical disease.

The following considerations form a background for an evaluation of the manner in which local and systemic factors are interrelated in the etiology of periodontal disease:

1. All clinical periodontal problems are basically gross expressions of microscopic tissue changes.
2. The microscopic tissue changes underlying clinical periodontal disease are essentially manifestations of the composite effect of local and systemic factors.
3. It is in terms of microscopic tissue changes that the ultimate significance of local and systemic causative factors in periodontal disease should be evaluated.

That periodontal disease, or any disease, is the result of the interaction of local and systemic causative factors is a generally recognized and accepted fact. In fact, it was the demonstration of this interrelationship in terms of specific tissue changes and its applicability to the periodontal problem that constituted the basis for the "bone factor" concept in periodontal disease.

This concept evolved from a series of autopsy studies and animal experiments

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focused on the histopathologic expression of local and systemic causative influences in chronic destructive periodontal disease. Within the limitations which govern the applicability of the results of animal experimentation to disease as it occurs in humans, the implications of the findings as they pertain to the clinical problem will be discussed.

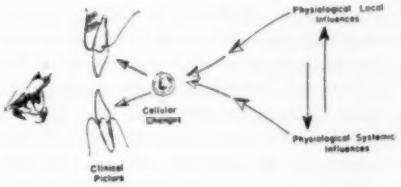



*Fig. 1 • Interrelation of local and systemic influences in the etiology of periodontal disease*

## REVIEW OF EXPERIMENTAL FINDINGS

simple local response or whether it is dependent in some degree on systemic regulation.[2] Extraction of functional antagonists was the method employed to alter the local environment. The findings indicated that whereas changes in the periodontal tissues resulted from altering the local environment, the nature of these changes was governed by the systemic background of the individual animals.

Another opportunity to evaluate the effect of systemic disturbances on the periodontal structures presented itself with the introduction of the drug alloxan for the production of experimental diabetes mellitus.[3] Examination of the peri- The initial experiment[1] dealt with the effect of acute starvation on the response of the periodontal tissues to artificially induced inflammation. The findings indicated first, that bone loss may occur in periodontal disease as a localized feature of a generalized systemically induced skeletal disturbance and second, that a generalized skeletal disturbance of systemic origin increases the severity of alveolar bone loss associated with a local condition such as gingival inflammation.

A series of experiments was conducted to determine whether the reorientation of the periodontal tissues in compliance with local environmental changes is merely a odontal structures in experimental diabetes revealed a tendency toward varying degrees of nonspecific osteoporosis of alveolar bone, unrelated to gingival changes, in approximately 40 per cent of the diabetic animals. These animals presented also a reduction in the distribution and the amount of bone formation, an increase in bone resorption and a loss of bone substance associated with peripheral fragmentation and dissolution of alveolar bone matrix. All the bone changes occurred in the absence of gingival inflammation.

The loss of tooth-supporting bone in experimental diabetes appeared as a local manifestation of a generalized tendency toward osteoporosis which affected not only the jaws but also the remainder of the skeletal system. The findings reemphasized the possibility that in periodontal disease neither the incidence nor the severity of alveolar bone destruction need, of necessity, be related to gingival changes.

The study of experimental diabetes was followed by investigation of the effect of acute vitamin C deficiency on the periodontal tissues of the guinea pig.[4] It was observed that in acute vitamin C deficiency, the periodontal membrane presented edema, hemorrhage and pronounced collagen degeneration. The

1. Glickman, Irving; Morse, Anna, and Robinson, Leonard. Systemic influence upon bone in periodontoclasia. J.A.D.A. 31:1435 (Nov.) 1944.

2. Glickman, Irving. Effect of acute starvation upon the apposition of alveolar bone associated with the extraction of functional antagonists. J. D. Res. 24:155 (June-Aug.) 1945.

3. Glickman, Irving. Periodontal structures in experimental diabetes. New York J. Den. 16:226 (June-July) 1946.

4. Glickman, Irving. Acute vitamin C deficiency and periodontal disease. I. The periodontal tissues of the guinea pig in acute vitamin C deficiency. J. D. Res. 27:9 (Feb.) 1948.

vessel channels and medullary spaces were enlarged and eroded. There was no new bone formation or osteoblastic activity in relation to the tooth-supporting bone. The over-all picture was one of generalized destruction of the periodontal tissues in the absence of any notable gingival inflammation or pocket formation.

The findings in acute vitamin C deficiency were comparable to those observed in experimental diabetes in that they showed loss of tooth-supporting bone unrelated to gingival inflammation or pocket formation. The findings in the vitamin C experiments, however, differed from those in diabetes in the nature of the bony changes and in the fact that whereas both the periodontal membrane and alveolar bone presented severe destructive changes in vitamin C deficiency, only bone changes were observed in experimental diabetes. Comparison of the findings in the two experiments is of interest because it demonstrates first, that more than one type of systemic change may produce generalized periodontal destruction; second, that although generalized loss of tooth-supporting bone may be a symptom common to different systemic disturbances, the detailed nature of the bone changes need not be the same; and third, that when a generalized loss of tooth-supporting bone occurs as the result of a systemic disturbance, the bone is not necessarily the only tissue involved nor need it be the tissue in which the destructive changes are manifested originally.

Once the nature of periodontal changes arising from acute vitamin C deficiency was established, the next problem was to determine its effect, if any, on the response of alveolar bone to gingival inflammation. Gingival inflammation was artificially induced in vitamin C deficient and control animals.[5] As a result, the bone margin beneath the inflamed gingiva in the control animals presented both osteoblastic destruction and osteoblastic activity with new bone formation. Comparable areas in the vitamin C deficient animals, however, presented no new bone formation. Instead, there was degeneration of a collagenous prebony matrix and osteoporosis of previously formed bone. Osteoblasts were rare. A prominent accumulation of connective tissue cells which separated the bony margin from the gingival inflammation and apparently gave rise to the osteoblasts in the control animals was absent in the vitamin C deficient animals. This retardation in the differentiation of connective tissue cells and ability to form and maintain new bone matrix accounted for the absence of well-formed new bone beneath the artificially induced gingival inflammation in the vitamin C deficient animals.

The vitamin C study added evidence in support of the existence of systemic regulatory influence on bone loss in destructive periodontal disease, which had been suggested by the previous findings. In addition, the vitamin C study demonstrated the specific manner in which the deficiency affected the response of alveolar bone to gingival inflammation. It was noted that although acute vitamin C deficiency of itself resulted in loss of alveolar bone, artificially induced gingival inflammation was an added destructive influence. The bone loss arising from gingival inflammation was more severe in the vitamin C deficient animals because of an inability on the part of these animals to maintain the existing alveolar bone or to form new bone to replace that destroyed by the inflammation.

In an experiment conducted on the albino rat to evaluate the periodontal tissue changes associated with protein deprivation and to compare these changes with those observed in other areas of the

5. Glickman, Irving. Acute vitamin C deficiency and the periodontal tissues. II. The effect of acute vitamin C deficiency upon the response of the periodontal tissues of the guinea pig to artificially induced inflammation. J. D. Res. 27:201 (April) 1948.

skeletal system, Chawla and Glickman[6] reported the following observations:

1. In the periodontal area, degeneration of connective tissue of the gingiva and periodontal membrane, osteoporosis of the alveolar bone and retardation in the deposition of cementum occurred.

2. In the femur and vertebrae, osteoporosis and inhibition of the endochondral and periosteal bone formation were observed.

3. The changes observed in the periodontal membrane and alveolar bone were identical with those observed in the periosteum and bone in other areas of the skeletal system.

4. Osteoporosis in protein deprivation resulted from reduced deposition of the osteoid, reduction in number of osteoblasts and retardation of the morphodifferentiation of connective tissue cells to form osteoblasts.

The observations in this study are of interest in that they reveal loss of alveolar bone, which is due primarily to the inhibition of normal formative changes rather than to the introduction of destructive changes.

The interrelation of local and systemic influences in chronic destructive periodontal disease needs clarification.[7] The crux of the clinical problem of chronic destructive periodontal disease lies in the alveolar bone. Regardless of the tissue or tissues in which destructive periodontal disease originates, its severity is gaged ultimately by its effect on the alveolar bone.

Normally, the height of alveolar bone is maintained by a constant equilibrium between bone formation and bone resorption. This physiological equilibrium is regulated by both local and systemic factors. In periodontal disease, bone loss occurs when the equilibrium is altered so that bone resorption exceeds bone formation. If resorptive changes in alveolar bone are stimulated, gingival inflammation, pocket formation, trauma and other local factors alter the balance between bone resorption and bone formation and thereby initiate periodontal bone loss. The severity of bone loss which occurs as the result of local factors is not determined by their duration and severity alone. The response of alveolar bone to local destructive influences is subject to the additional regulation of the individual systemic background. Because it regulates the destructive effect of local factors on alveolar bone, the "bone factor" is a basic determinant of the severity of bone loss in all cases of periodontal disease.

Two aspects of the "bone factor" are pertinent to the clinical problem of periodontal disease. The first is the fact that the "bone factor" regulates the response of alveolar bone to the destructive effect of local factors. Although local causative factors in periodontal disease are generally referred to in specific terms such as overhanging fillings, calculus and food impaction, they can be divided also into the following fundamental classifications: mechanical, chemical, thermal and bacteriological. Common to all of the local factors generally considered of causative significance in periodontal disease is the fact that they produce inflammation in the gingiva and periodontal membrane. Gingival inflammation may be an early or late change. It may occur in otherwise unaltered periodontal tissues, or it may appear in tissues already affected by destructive tendencies resulting from systemic influences. The significance of inflammation, regardless of when it occurs, lies in the fact that it stimulates destruction of alveolar bone. When inflammation is the initial periodontal alteration, its destructive effect in the presence of a normal "bone factor" is less severe than when it is superimposed on an underly-

6. Chawla, T. N., and Glickman, Irving. Protein deprivation and the periodontal structures of the albino rat. Oral Surg., Oral Med. & Oral Path. 4:578 (May) 1951.

7. Glickman, Irving. Experimental basis for the "bone factor" concept in periodontal disease. J. Periodont. 20:7 (Jan.) 1949.

ing bone-destructive tendency of systemic origin. It may, therefore, be considered a general rule that the rapidity of the alveolar bone destruction which results from gingival inflammation varies according to the status of the "bone factor."

Demonstration of the fact that the "bone factor" exerts a regulatory influence on the destructive effect of gingival inflammation does not minimize the importance of local factors in the causation of periodontal disease. It merely indicates that the significance of comparable local factors varies from patient to patient according to the modifying effect of the individual "bone factor." It has already been noted that the destruction of alveolar bone which results from a simple local gingival irritant is not to be considered a purely local phenomenon independent of systemic regulation.

The implication of the "bone factor" concept in regard to functional occlusal forces is particularly pertinent to the problem of traumatic occlusion. Whether or not an external force transmitted to the periodontium is traumatic or nontraumatic depends on the response it elicits in the tissues. An occlusion which is injurious to the periodontal tissues is traumatic; the extent to which it is traumatic is determined by the severity of the tissue changes it produces and not by the amount or direction of the forces it transmits. An alteration in the local functional environment which may be an innocuous or even bone-formative stimulus in the presence of a favorable "bone factor" may become a local destructive agent when the "bone factor" is altered so as to inhibit the normal accommodation mechanism of alveolar bone.

It is important, however, not to minimize the contribution of local influences in producing the ultimate clinical changes in periodontal disease which is basically the result of systemic influences. Local factors are often the precipitating mechanisms whereby the effect of systemic disturbances on the periodontal tissues becomes clinically apparent. From the viewpoint of treatment, elimination of local factors often effects the clinical control of periodontal disease in cases in which minimal destructive tendencies of systemic origin may still persist.

The second aspect of the "bone factor" which must be taken into consideration is the fact that if the "bone factor" is sufficiently altered periodontal bone loss may occur in the absence of harmful local factors. Although the "bone factor" concept recognizes destruction of alveolar bone from systemic disturbances in the absence of harmful local factors, it does not support the arbitrary division of chronic destructive periodontal disease into so-called "local" and "systemic" types. It conceives of the systemic influence on alveolar bone as being constantly effective in health and disease. What varies is the nature of the systemic influence, insofar as it is reflected in specific microscopic changes in alveolar bone. Because the status of the individual systemic background cannot always be categorized by the extremes of "health" or "disease," its "formative" or "destructive" influence on alveolar bone is of necessity characterized by subtle variations rather than by the opposite extremes suggested by attempts at clear-cut clinical division of periodontal disease into the so-called "local" and "systemic" types.

In healthy individuals a positive "bone factor" or favorable bone-formative potential exists. It is manifested microscopically by osteoblastic activity and well-formed new bone in the periodontal area as well as throughout the skeletal system. This bone formation in close proximity to resorptive changes in relation to gingival inflammation is evidence of the positive "bone factor" associated with systemic health. In the light of such microscopic findings, it is difficult to presume that participation of systemic influences in destructive periodontal disease occurs only in unhealthy individuals or

that such influence is of necessity detrimental to the maintenance of alveolar bone. Instead, it would appear that there is a systemic component in all cases of periodontal disease, that its nature varies in accordance with alterations in the systemic background and that variations in the systemic component may retard or accelerate the bone loss incurred on account of harmful local stimuli or may even result in periodontal bone loss in the absence of detectable destructive local factors.

In systemic disease an unfavorable or negative "bone factor" may exist. A negative "bone factor" means inability to form new bone or to maintain that which already exists. Some systemic disturbances produce specific changes in alveolar bone. It has already been demonstrated that different systemic disturbances may be responsible for comparable nonspecific destructive alveolar bone changes even though systemic diseases do not directly affect alveolar bone and it is not alone in specific systemic diseases that the "bone factor" may be altered. Skeletal osteoporosis has been described in its associations with modifications of physiological processes not categorized as specific disease entities.

The "bone factor" concept does not infer that alveolar bone is the tissue of origin in all cases of chronic destructive periodontal disease, that it is the only periodontal tissue which may be affected by systemic disturbances or that it is always affected by all systemic alterations. Involvement of periodontal tissues other than alveolar bone has been produced by systemic disturbances in experimental animals. In periodontal disease the periodontal tissue in which destructive changes first appear is determined by the nature of the responsible causative factors. Experimental findings indicate that systemically induced periodontal disease may originate in any one or more of the periodontal tissues, depending on the nature of the responsible causative factors. It is as fallacious to assume that all cases of periodontal destruction originate in the same tissue as it is to postulate that there is only a single condition, local or systemic, capable of inducing periodontal disease.

The effect of systemic influences on periodontal tissues cannot be expressed in absolute positive or negative values. Instead, systemic influences result in various degrees of subtle morphological changes. By small differences, the changes lead progressively from the normal to abnormal tissue loss. Systemic influences which result in tissue loss do not always produce degenerative changes. Tissue loss may be produced simply by a reduction in the normal formative processes or by a retardation in the development of cells required for the normal formative processes. In dealing with destructive periodontal disease which is systemically initiated, we are dealing not with a disease of the periodontium in itself but with the effect of disease on the periodontium. It is the subtle nature of the systemic effect on the response to local environmental factors on which interpretation of clinical phenomena should be based. Considerable additional study, utilizing such methods as histochemical and radioactive technics, remains to be employed to clarify further the interrelation of local and systemic influences on periodontal tissues, influences which have escaped detection by usual histological methods.

All periodontal disease results from the interaction between local and systemic influences (Fig. 2). All gradations occur in the proportion of local and systemic participation; there are cases in which either local or systemic participation is the major causative factor. The possible variants in the clinical features of periodontal disease are multiple, dependent on three factors: (1) the nature of the local environmental conditions, (2) the patient's background and (3) the stage of jaw development at which local or systemic disturbances first appear.

The "bone factor" concept envisions systemic participation in all cases of periodontal disease. As a consequence, the clinical approach to the diagnosis of individual cases of this disease does not entail the determination of whether systemic factors are responsible for the bone loss or whether it is of purely local origin. The fundamental clinical problem is that of determining the extent of systemic participation and whether its influence is a favorable or a harmful one.

The viewpoint that periodontal disease is a composite of subtle interrelated phenomena rather than the simple resultant of local and systemic factors has been given impetus by the investigations of Selye[8] in regard to stress and the "general adaptation syndrome."

Many forms of stress which affect the body generally appear to produce a number of interrelated, nonspecific somatic changes. The composite of all the systemic reactions of the body which result from continued exposure to stress has been termed the general adaptation syndrome and is described as the basis for the pathogenesis of many diseases previously considered to be of unrelated etiology.

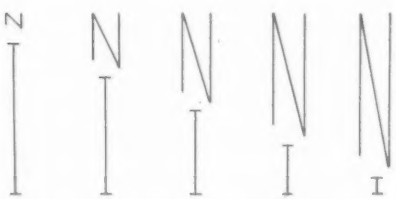



*Fig. 2 • Chronic destructive periodontal disease resulting from a combination of local (I) and systemic (N) causation. I: inflammatory changes; N: noninflammatory physiological : pathological equilibrium. Extreme left: cases consisting largely of locally induced inflammatory changes with a comparatively small systemically induced noninflammatory destructive component. Extreme right: cases consisting for the most part of systemically induced noninflammatory destructive changes with a comparatively small locally induced inflammatory component. Majority of cases: gradations between extremes*

According to Selye, the general adaptation syndrome is a group of generalized physiologic mechanisms which represent an attempt on the part of the body to resist the damaging effect of stress. The general adaptation syndrome is differentiated from specific adaptive responses of the body such as immunologic reactions to bacterial protein and tissue hypertrophy in response to increased functional demand.

Stress acts through the endocrine glands, particularly the anterior lobe of the pituitary gland and the adrenal cortex, to produce the morphologic and functional changes which comprise the general adaptation syndrome. Among these changes are: (1) enlargement of the adrenal cortex with increased secretion of adrenocorticoid hormones, (2) involution of lymphatic organs, (3) hyalinization and inflammatory changes in blood vessels with hypertension, (4) gastrointestinal ulceration and (5) malignant nephrosclerosis. The rheumatic-allergic collagen diseases of man are checked by treatment with ACTH and cortisone and appear to be part of the general adaptation syndrome. The adaptive mechanism of the body in response to stress inadvertently produces conditions which are recognizable disease entities. Selye terms these diseases the diseases of adaptation.

Included in the variety of stimuli which may act as "stress" are the following:

1. Trauma. Simple surgical trauma was employed experimentally by Selye to produce enlargement of the adrenal cortex, gastrointestinal erosions and acute involution of thymus and lymph nodes and spleen. Chronic exposure to slight trauma produced similar experimental re-

8. Selye, H. General adaptation syndrome and diseases of adaptation. J. Clin. Endocrinol. 6:117 (Feb.) 1946.

sults, but a certain degree of adaptation was acquired.

2. Hemorrhage.

3. Burns. Death due to severe burns may be attributed to adrenal exhaustion in the alarm reaction according to Glendening and others.[9]

4. Temperature. Exposure to cold elicits typical alarm reaction changes.

5. Roentgen rays and other ionizing radiations.

6. Nervous stimulation. Emotional stress appears to be associated with changes seen in the general adaptation syndrome; hypertension is one of the more obvious disease entities associated with it.

7. Muscular exercise. Excessive exercise is highly effective in producing symptoms in experimental animals.

8. Drugs and toxic compounds.

9. Diet. Any severe quantitative or qualitative nutritional deficiency acts as a potent alarm stimulus. Starvation, protein deficiency and certain vitamin deficiencies all serve as stress entities and induce systemic reactions. In undernourished animals there is cortical hypertrophy but cessation of growth. This is the result of a shift of pituitary hormone production by which corticotrophin is produced in place of other hormones.

The possible influence of stress in the causation of periodontal disease suggested a comprehensive approach to the periodontal problem consistent with the basic viewpoint of the "bone factor" concept. To explore the implications of stress and its associated hormonal changes on the periodontal tissues, an experiment was conducted[10] in which animals were subjected to daily injections with 0.5 mg. of cortisone[11] for periods up to 43 days. Microscopic examination of the periodontal structures revealed a reduction in the height of alveolar bone; osteoporosis of alveolar bone characterized by reduction in the number of osteoblasts and newly formed osteoid matrix; a fibrinoid appearance of the periodontal membrane with a reduction in the number and degeneration of the collagen fibers of the periodontal membrane and gingival connective tissue. These changes occurred in the absence of gingival inflammation, which was present in isolated areas associated with local irritation. The findings in the alveolar bone and periodontal membrane were duplicated in the periosteum and bone areas of the skeletal system.

Although this is the initial study in the field of corticosteroid hormones and the periodontal structures, it suggests a relationship between periodontal disease and systemic influences which may constitute the beginning of an entirely new chapter in our understanding of the etiology of periodontal disease.

## RECAPITULATION

The "bone factor" concept is essential to an analysis of periodontal disease. The interrelation of local and systemic influences in the etiology of periodontal disease is manifested in microscopic tissue changes. A comprehensive basis for the etiology of periodontal disease may evolve from further study of the hormonal changes associated with stress.

9. Glendening, M. B., and others. Study of the alarm reaction in burned human subjects and its possible significance in war injuries. (Abst.) Endocrinology 35:220 (Sept.) 1944.

10. Glickman, Irving; Stone, I. C., and Chawla, T. N. Effect of cortisone acetate (11-dehydro-17 hydroxycorticosterone-21 acetate) on the periodontal tissues of white mice. (Abst.) J. D. Res. 30:461 (Aug.) 1951.

11. A brand of cortisone acetate by Merck and Co., Inc., was used in the experiment.

# The Askov dental demonstration

*William A. Jordan, D.D.S., M.P.H., Minneapolis*

The community dental health program offers the greatest potential instrument by which people as a whole can obtain better dental health through preventive and control measures, education and the promotion of dental care. The study now in effect in Askov, Minn., is a 10-year demonstration designed to accumulate as many facts as possible concerning the organization, procedures and benefits of a community program. The Minnesota State Dental Association, the Minnesota Department of Health, the community of Askov and the U. S. Children's Bureau are sponsoring this program jointly.

Askov is a small Danish farming community located in the northeastern section of Minnesota. The town population is about 225, but there is a consolidated school with a population of over 250 students. The school district includes a large rural area and three smaller communities from which students enter Askov's high school. Askov has no resident dentist. Patients must travel at least 10 miles for any dental services.

In 1947 at the request of the dentists of a nearby town and of the people of Askov, the dental personnel of the Minnesota Department of Health surveyed the children of the Askov school. The examination was made with mouth mirror and explorer with direct light in the mouth. The result of this survey is shown in Table 1. An unusually high DMF rate was found among these children.

In 1943 John W. Knutson[1] made a similar study of this community, but because of the war and lack of personnel it was not feasible to set up a community program at that time. Dr. Knutson's observations were similar to those recorded in 1947. A comparison of the two surveys shows that there was no improvement in the dental health of these children between these dates.

This grave situation was reported to the dental health council of the Minnesota State Dental Association. Considerable planning and discussion took place before the present total dental health program was finally approved by the sponsoring groups. The U. S. Children's Bureau granted financial assistance to the program. The Askov dental demonstration was established with the following objectives: (1) to determine the results of a composite of dental caries preventive measures, (2) to determine the values of total dental care over a 10-year period for children of certain age groups, particularly for those entering the program at the age of 3, (3) to determine methods by which dental health education can be correlated with the class-

Presented before the combined Sections of Pedodontics, Oral Hygiene and Public Health, ninety-second annual session of the American Dental Association, Washington, D. C., October 16, 1951.

Director, division of dental health, Minnesota Department of Health, Minneapolis.

1. Jordan W. A. Dental services wanted. North-West Den. 27:49 (Jan.) 1948.

room curriculum, (4) to accumulate data on the procedures of establishing a dental care program, (5) to accumulate data on operating costs of a complete dental care program and on separate units of such a plan and (6) to accumulate time data on various dental operations and treatments.

### ORGANIZATION

The first step was to organize a dental health council with five active committees to carry out the policies and procedures of the program. Since this was the first health program of any type developed for the community, no health council was in existence. In the future, if the health program expands and a community health council is organized, the dental health council will become the dental committee of that group. The present dental health council is composed of seven members: the school superintendent, the county nurse, representatives from Pine County dentists and local and rural representatives. It is anticipated that the council will eventually assume the complete jurisdiction of the program so that at the end of the 10-year demonstration the community of Askov will carry on its own program. All policies, problems and procedures are to be directed through this council.

The five committees appointed to work under the council were the publicity committee, the installation committee, the welfare committee, the fund committee and the preschool committee. The first responsibility of the installation committee was the remodeling of a school classroom for a dental office; its present responsibility is the upkeep of the equipment. The community was financially responsible for this part of the program.

To endeavor to carry out the policy of the American Dental Association regarding dental care for all regardless of income or geographic location, the fund committee was requested to raise a substantial amount to care for the dental corrections of the children of needy families. The committee decided to establish a revolving fund from which a needy family might borrow without interest the money necessary for dental care. The money is to be paid back by the family in any convenient number of payments. All loans to families requesting aid must first be approved by the welfare committee. This is a local welfare committee, not a county agency. Plans are being formed to include in the program the direct relief cases that fall under the jurisdiction of the county welfare board. The sponsoring groups decided to confine the program to Pine County. All six dentists of the County expressed a desire to take part in the program. The committee of social research of the Minnesota State Dental Association acts as the guiding and coordinating council for the Minnesota State Dental Association.

Table 1 • DMF rate, by age group, of 246 Askov, Minn., public school children in 1947

| Age group | Number examined | Avg. no. of permanent teeth per child | | | |
|---|---|---|---|---|---|
| | | Decayed | Missing | Filled | DMF |
| 6 | 8 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 31 | 1.28 | 0.03 | 0.27 | 1.58 |
| 8 | 27 | 2.85 | 0.11 | 0.44 | 3.40 |
| 9 | 22 | 1.60 | 0.00 | 1.27 | 2.86 |
| 10 | 21 | 2.11 | 0.33 | 1.80 | 4.24 |
| 11 | 22 | 2.00 | 0.50 | 2.32 | 4.82 |
| 12 | 23 | 2.83 | 0.96 | 2.95 | 6.74 |
| 13 | 22 | 3.99 | 0.91 | 3.14 | 8.04 |
| 14 | 17 | 3.59 | 2.41 | 5.00 | 11.00 |
| 15 | 25 | 3.08 | 1.24 | 6.52 | 10.84 |
| 16 | 11 | 4.00 | 1.72 | 7.37 | 13.09 |
| 17 | 16 | 2.13 | 2.62 | 8.00 | 12.75 |

### POLICIES

The following policies, based on the American Dental Association's statement of principles,[2] were decided by the Askov dental health council in conjunction with the local dentists and were approved by

2. American Dental Association. Dental health program for elementary and secondary schools, p. 8.

the committee on social research, the Minnesota Department of Health and the U. S. Children's Bureau:

1. The demonstration is to extend for 10 years.

2. All children from 3 to 17 years who attend the Askov School are eligible.

3. Every parent or family has the privilege of selecting the participating dentist; thus free choice of dentist by the patient is maintained.

4. All children in the program are eligible to receive the benefits of any or all of the preventive and control measures free of charge upon authorization of the parents or guardian. At present these preventive features are financed by funds from the U. S. Children's Bureau. Eventually the community will assume the cost.

5. The participating dentists receive an hourly fee of $8 for making dental examinations and giving topical applications of sodium fluoride.

6. All corrective and restorative work is charged by the dentist of choice directly to the family. The collection of fees and method of payment are the responsibility of the individual dentist.

7. The eligible child is permitted to take part in any phase of the program, including preventive and control features, education and dental care. Parents are not discouraged from having dental work done by other than the participating dentists. Effort is made to contact nonparticipating dentists who serve some of these children so that all possible data can be collected. Only in the topical application of fluoride does the family not have a choice of dentist. Because group fluoride treatments are timesaving and economical, one dentist is assigned to this each day and he takes all patients who are to be treated on that day.

8. The first examination was made in January 1949. All subsequent dental examinations begin on or about September 15 of each school year. September 15 is also the date to change all age records. For example, John Doe who is 14 on September 10 will be recorded as 14 years as of September 15. If he will be 14 on October 1, his age for the school year will be recorded as 13 until the next September 15. This method helps to simplify the statistical work.

9. The financial data are tabulated according to the fiscal year of the Minnesota Department of Health, that is, July 1 to June 30. All examination data and other information on the program are tabulated according to the school year. The annual progress report is published at the end of the calendar year.

10. The division of dental health of the Minnesota Department of Health acts as the supervising agency, assists in directing activities, collects all data, tabulates all statistical records and reports the results. The division is responsible for presenting a progress report annually to the Minnesota State Dental Association, the Minnesota Department of Health, the U. S. Children's Bureau and the community of Askov. Each year to date a verbal report has been given to the people of Askov.

11. All participating dentists are scheduled for a week's special training in dentistry for children at the School of Dentistry, University of Minnesota.

Hinckley, Minn., a community in Pine County, 20 miles south of Askov, serves as the control for this study and demonstration. Biennial dental examinations are made of the 3 to 17 age groups by mouth mirror and explorer under a good light. Observations on these examinations are compared with observations on similar examinations of the Askov children.

Hinckley continues to carry on the dental card program, which was in use there at the time the Askov program was established, but is not encouraged to begin new dental health programs until the Askov demonstration ends. Parents, however, on their own initiative procure whatever dental care and follow whatever preventive measures they desire.

Absolute controls are hard to establish with the present widespread publicity for various preventive features. In Hinckley, previous to the Askov program, little care was given to deciduous teeth. Since the inauguration of the Askov program, which is well known to the people of Hinckley, the local dentist's work for children and the care of deciduous teeth have greatly increased.

## PROCEDURES

*Dental Examinations* • In September all children 3 to 17 years of age receive a complete dental examination, including bitewing roentgenograms, from their selected dentist. The dentist is required to make a mouth mirror and explorer examination first and then to read the bitewing roentgenograms and to insert the findings in different colored lead. Studies are made of the value of roentgenograms in dental examination.

A full time dental assistant keeps a record of all appointments and data on examinations. The parents are requested to be present at the dental examination. To help save time for both the parents and the dentist, appointments are scheduled by family groups rather than by grade. Thus at the same time the parents receive the information on the dental health of all their children and learn the fees that will be necessary for all restorative work.

*Lactobacillus Counts* • Laboratory counts of lactobacilli per cubic centimeter of saliva are used in this study.[3] These counts are taken each year at the beginning of the school term. The counts are made by the Minnesota Department of Health, and a report of each individual's count is placed on his annual examination record. Before the program started, two or three lactobacillus counts were taken of all eligible children. Collection of the saliva specimens, made as close to 11 A.M. as possible, is a classroom project under the supervision of a public health dentist or a dental health adviser.

## PREVENTIVE FEATURES

*Topical Application of Fluoride*[4,5,6] • At the beginning of the program, all children 3 to 17 years received the fluoride treatment. Each year since then the children of the age groups 3, 7, 10 and 13 years receive this treatment. The treatment is given in the dental office in the school with a dental health adviser from the Minnesota Department of Health assisting the participating dentist. A prophylaxis is given at the first sitting. Thereafter four applications of a 2 per cent sodium fluoride solution are given on four consecutive days. Authorization by a parent must be on file before the fluoride treatment is begun.

*Mouth Hygiene* • All children 3 through 17 years of age receive two toothbrushes per year as well as all necessary ammoniated tooth powder, which is used as a possible aid in the reduction of dental caries.[7] A dental health adviser instructs the teachers and the children in a proper method of brushing the teeth, placing emphasis on brushing the teeth immediately after the meals.[8] Askov elementary grades have two daily toothbrushing drills supervised by the classroom teacher,

3. Jay, Philip. Reduction of oral Lactobacillus acidophilus counts by the periodic restriction of carbohydrate. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 33:162 (March) 1947.

4. Knutson, J. W., and Armstrong, W. D. Effect of topically applied sodium fluoride on dental caries experience; report of findings for third study year. Pub. Health Rep. 61:1683 (Nov. 22) 1946.

5. Jordan, W. A., and others. Effects of various numbers of topical applications of sodium fluoride. J.A.D.A. 33:1385 (Nov.) 1946.

6. Galagan, D. J., and Knutson, J. W. Effect of topically applied fluorides on dental caries experience; report of findings with 2, 4 and 6 applications of sodium fluoride and of lead fluoride. Pub. Health Rep. 62:1477 (Oct. 10) 1947.

7. Kesel, R. G., and others. Ammonia production in the oral cavity and the use of ammonium salts for the control of dental caries. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 33:80 (Feb.) 1947.

8. Fosdick, L. S. Reduction of the incidence of dental caries. I. Immediate toothbrushing with a neutral dentifrice. J.A.D.A. 40:133 (Feb.) 1950.

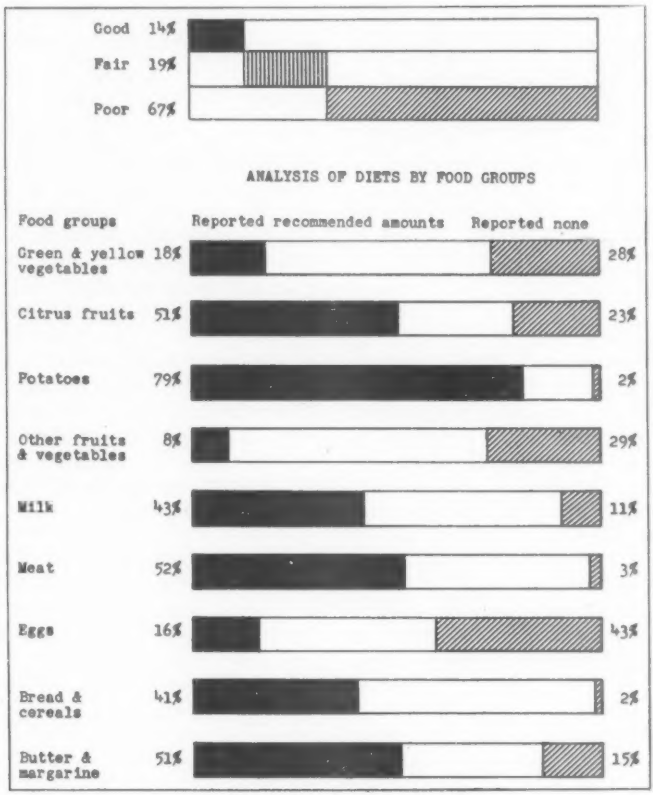



*Fig. 1 • Classification of diets reported by 269 pupils of the Askov School (Dec. 12, 1948)*

the first just before school begins in the morning and the second immediately after the noon lunch. Secondary school students are taught proper brushing technic with the use of ammoniated powder and are urged to practice good dental hygiene at home. The preschool children also are given toothbrushes and powder. Their parents are instructed in the proper technic of brushing and are requested to assist their children in applying these practices at home.

*Diet Control* • Reduction of excessive sweets in the daily diet to aid in prevention of dental caries is emphasized in this program.[9] The people of this Danish community are accustomed to a diet high in pastries and other sweets. A diet survey conducted in both Askov and Hinckley showed that the Askov children were not getting the recommended

9. Jay, Philip. The role of sugar in the etiology of dental caries. J.A.D.A. 27:393 (March) 1940.

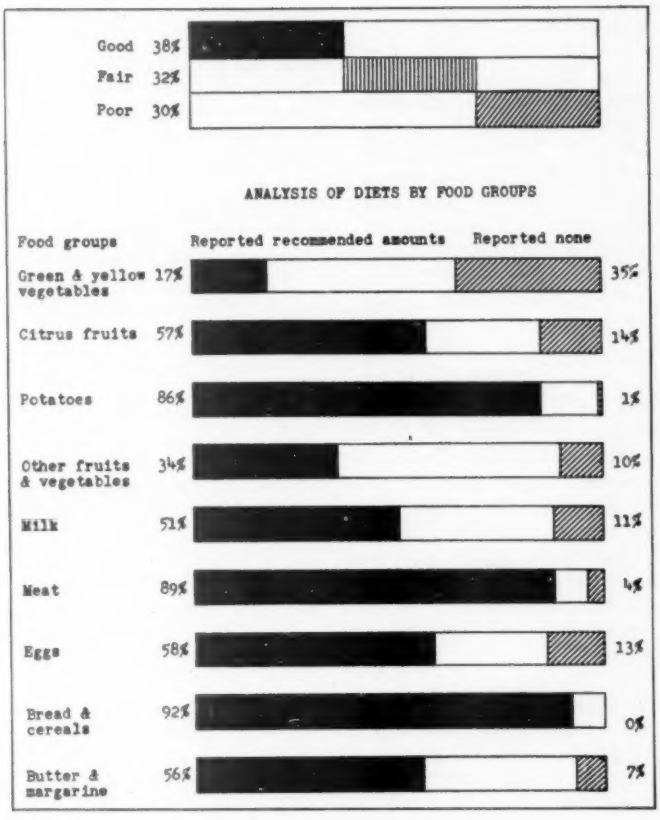



*Fig. 2 • Classification of diets reported by 232 pupils of the Hinckley School (March 27, 1949)*

amounts of basic foods necessary for proper growth and development. Figures 1 and 2 show that the diet of Askov children was considerably poorer than that of Hinckley children.

Concentrated efforts were made to improve the nutrition of the Askov children. A white rat nutrition study was employed to demonstrate the value of good nutrition. The study was conducted as a classroom project in the biology class, and all rooms had an opportunity to observe it. The first study, which was carried on during the months of December and January, did much to change the attitude of these children toward sweets. In fact, the local merchants stated that their Christmas sale of candies was reduced nearly 50 per cent. Permanent results in this field, however, can be obtained only by continuous efforts.

During the year at the request of the dentist and with the approval of the parents, children who showed a high

**Table 2** • Value of posterior bitewing roentgenograms for children 3 through 17 years

| Date of examination | Number of children | Average no. of carious surfaces per child in posterior teeth | | Additional carious surfaces per child diagnosed in posterior teeth by use of roentgenograms | |
|---|---|---|---|---|---|
| | | Clinical exam. | Clinical & roentgenogram | | |
| Jan. 1949 | 346 | 10.79 | 13.91 | 3.12 = 22.4% | |
| Sept. 1949 | 334 | 7.78 | 10.65 | 2.87 = 26.9% | 24.2% |
| Sept. 1950 | 278 | 6.90 | 8.99 | 2.09 = 23.2% | |

lactobacillus count and active caries were placed on a low carbohydrate diet for six to seven weeks. The nutritionist of the Minnesota Department of Health has given much time to this phase of the Askov program. Before patients were placed on the diet, the mothers were called into a conference with the nutritionist. Follow-up home calls were made during the diet program to see if any new problems developed. The school lunch is being revised to meet the aims of the program.

*Dental Health Education* • Inservice training of teachers is the first step in dental health education. The purpose is to familiarize the teacher with the Askov demonstration and to supply ideas and methods that can be used in classroom teaching. Since a special "health class" is often frowned on, attempts are being made to determine whether dental health education can readily be correlated with other classroom subjects. Experiments that were tried include a rat study in a biology class and a study of ammoniated dentifrices and fluorides in a chemistry class. Teaching outlines[10] are being used as a guide for the teacher. The entire school dental program is educational because the child learns best by actual participation.

*Dental Care* • In accordance with the policies of the program, all children desiring dental care may have the necessary work done in the modern dental office that has been established in the school. The participating dentists come to this office on appointment. The dentists schedule themselves for corrective work on full days or half-days, according to the patient load. Only one dentist per day is scheduled. Emergency care is given any child by the dentist present in the office. Corrective work follows the examinations and the fluoride treatments in the fall and is carried on throughout the year.

## DATA ON THE STUDY

*Value of Bitewing Roentgenograms* • In each of the past three years, a study has been conducted to determine the value of bitewing roentgenograms in the dental examination. Table 2 shows the results of three years' study of this aspect of the program. According to this table, without the use of roentgenograms dentists were missing one fourth of the caries present. The table shows also the reduction in caries during the three years.

*Lactobacillus Acidophilus Counts* • *Lactobacillus acidophilus* counts are used as a means of measuring the progress of the program. The counts are divided into three categories: low (counts negative or under 10,000); moderate (10,000 to 49,999); and high (counts 50,000 and over). At the beginning of the program in the fall of 1948, over 70 per cent of the children examined had *L. acidophilus* counts of over 10,000. Many had extremely high counts. Only 27 per cent of the counts were in the low category. Two or three counts for each child were taken to compute his average count. A definite correlation of the lactobacillus count with caries activity is shown in Table 3. The new carious surfaces were computed by

10. Irwin, V. D., and Wilson, Netta W. Dental health teaching outlines. Books I, II, III, IV. St. Paul, Bruce Publishing Co., 1948.

comparing the September 1949 with the September 1950 dental examinations and bitewing roentgenograms. In 1949, 35.8 per cent of the lactobacillus counts were classed in the low group, whereas in 1950, as noted in Table 3, 48.9 per cent were in the low group. The computation of the lactobacillus counts has been a tremendous educational aid. The parents became quite interested in this procedure, and their understanding of the counts helped to gain considerable cooperation from them because they could actually see results.

Children recorded in Table 3 as having a low lactobacillus count averaged 1.50 new carious surfaces in the year's time. Those with moderate counts averaged 4.35, and those with high counts averaged 4.97. There is a statistically significant difference between these means. The difference is even more noticeable among the 41 children in the 3 to 5 age group. Those with low counts averaged 1.72 new carious surfaces and those with high counts averaged 8.92. All caries in the 3-year-old group were counted as new caries.

*Caries Reduction* • The def and DMF data were grouped into 3 to 5, 6 to 12 and 13 to 17 age groups and then compared with the same rates from the October 1948 and the October 1950 Hinckley dental examinations. Table 4 shows these comparisons. The Hinckley (control) dental examinations were made by mouth mirror and dental explorer under a good light. The Askov examinations were made under the same conditions with the addition of posterior bitewing roentgenograms. The comparison shows that although the Askov DMF rate was extremely high to start with, there was a substantial reduction. The Askov 3 to 5 age group showed a mean def reduction of 3.87 in deciduous teeth during the 21 months between January 1949 and September 1950. A mean DMF reduction of 1.78 and 1.32 respectively in permanent teeth was noted in the 6 to 12 and 13 to 17 age groups (Fig. 3). The greatest reduction occurred in the age group 3 to 5. The mean DMF reduction was progressively smaller in the older age groups. The percentage of reduction ranged from 41.6 in the 3 to 5 age group to 8.4 in the 13 to 17 age group.

In January 1949, 96.6 per cent of the 3 to 5 age group showed evidence of dental caries. In September 1950 only 77.1 per cent of the 3 to 5 age group showed dental caries experience. In the 3 to 5 age group 23 per cent were caries-free in 1950 as compared with only 3 per cent in January 1949. In the 6 to 12 age group in January 1949, 89 per cent of the children showed evidence of dental decay in the permanent teeth, whereas in September 1950, 78.9 per cent showed dental caries experience. Ten per cent more children in this age

**Table 3** • Relationship of *Lactobacillus acidophilus* counts, carious teeth and new carious surfaces, Askov September 1950

| Age group | Number in group | Low *L. acidophilus* count (below 10,000) | | | Moderate *L. acidophilus* count (10,000-49,999) | | | High *L. acidophilus* count (50,000 and up) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Per cent of children | Average carious teeth per child | Average new carious surf. per child | Per cent of children | Average carious teeth per child | Average new carious surf. per child | Per cent of children | Average carious teeth per child | Average new carious surf. per child |
| 3-5 | 41 | 60.9 | 3.24 | 1.72 | 9.8 | 4.75 | 6.75 | 29.3 | 9.25 | 8.92 |
| 6-12 | 142 | 38.0 | 3.48 | 1.22 | 28.9 | 7.56 | 4.17 | 33.1 | 7.38 | 3.94 |
| 13-17 | 89 | 60.7 | 5.13 | 1.69 | 19.1 | 9.59 | 4.24 | 20.2 | 10.50 | 5.06 |
| 3-17 | 272 | 48.9 | 4.11 | 1.50 | 22.8 | 7.94 | 4.35 | 28.3 | 8.40 | 4.97 |

**Table 4** • Comparison of DMF rates and lost teeth per 100 children for Askov and Hinckley, October 1948 to October 1950

| | | Age group* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-5 | | | 6-12 | | | 13-17 | | |
| | | Jan. 1949 | 1949 | 1950 | Jan. 1949 | 1949 | 1950 | Jan. 1949 | 1949 | 1950 |
| Examined† | Askov | 58 | 51 | 48 | 163 | 153 | 142 | 125 | 117 | 88 |
| | Hinckley | 54 | | 63 | 193 | | 230 | 250 | | 253 |
| DMF Teeth | Askov | 931 | 800 | 544 | 565 | 462 | 387 | 1,572 | 1,557 | 1,440 |
| | Hinckley | 315 | | 448 | 373 | | 334 | 933 | | 933 |
| DMF surfaces | Askov | 1,681 | 1,324 | 869 | 1,054 | 874 | 710 | 3,299 | 3,339 | 3,024 |
| | Hinckley | 522 | | 668 | 538 | | 496 | 1,628 | | 1,619 |
| Lost teeth | Askov | 84 | 53 | 2 | 26 | 31 | 21 | 149 | 162 | 133 |
| | Hinckley | 0 | | 8 | 26 | | 21 | 112 | | 113 |

*The rates for the 3-5 year age group are for deciduous teeth only. The rates for the 6-12 and 13-17 age groups are for permanent teeth only.

†Askov examinations are made yearly in September. First year Hinckley examinations were made in October 1948, second in October 1950.

group were caries-free in respect to the permanent teeth in 1950 as compared with January 1949. No significant change has appeared as yet in the 13 to 17 age group.

*Control of Diet* • Figures 1 and 2 show that the diet of Askov children was considerably poorer than that of Hinckley children at the beginning of the study. A deficiency in such foods as citrus fruits, green and yellow vegetables, milk, bread and eggs was noticeable in the Askov diet. The Hinckley report showed an average diet but that reported for the Askov group was rather poor. In January 1951 a second diet survey was taken in Askov, which covered 249 students in the age groups 3 to 5 and grades 1 through 8. The percentage of students reporting good diets increased from 14 to 21 and of those reporting fair diets from 19 to 29. The percentage of students reporting poor diets decreased from 67 to 50. Although some progress was noted in this study, more emphasis on nutrition is necessary.

A diet control period for a group of students was scheduled during the school term. Table 5 shows the number placed on a controlled diet since the beginning of the program. Out of 139 students who followed the control diet 39.5 per cent showed that their lactobacillus counts were reduced to a negligible amount.

There is an apparent direct relationship between family interest and the results of the diet control. The lactobacillus count almost invariably falls below 10,000 when the parents and children appear to follow the diet conscientiously. In most cases the count does not drop when the parent is not quite "sold" on the diet program, when the child surreptitiously slips candy into his mouth during school hours or when he strays from the diet regimen. At the present stage of this demonstration program, group diet control has revealed problems that at present have been met only partially. Regardless of the problems, the diet control program and the education in nutrition have aroused much interest among the parents.

Table 6 shows the changes in the lactobacillus counts of some 74 Askov children placed on a controlled diet. There was a reduction in the counts of 65 per cent of the participants. Of these 36.5 per cent had counts in the low group;

6 children, or 6.1 per cent of the group, had counts in a higher group than the one in which they started; 40 children, or 54.1 per cent, had counts in a lower group; and 28, or 37.8 per cent, remained in the same group.

### COST OF THE PROGRAM

Table 7 shows the cost of the Askov program for the past three years ending June 30, 1951. The community of Askov paid for the remodeling of the office space, for the upkeep of the room and for utilities such as heat, water and light. These charges are included under the subtitle "Askov community." Each year to date there has been a definite reduction in the cost of the program. This year the cost of corrective services has dropped considerably. The reduction can mean two things: first that the backlog of dental needs is cared for and second that a reduction in caries activity is revealed by a reduced need for dental correction.

The average cost of the program for the first year was approximately $48 per child as compared with $26.50 in the second year and $23 in the third year. The high first year cost included all necessary equipment. A true comparison of cost will be available at the end of the 10 years when all sums spent for materials can be evenly distributed.

For the first three years the average cost of the lactobacillus services has been approximately $3.80 per eligible child per year. The cost for the toothbrush

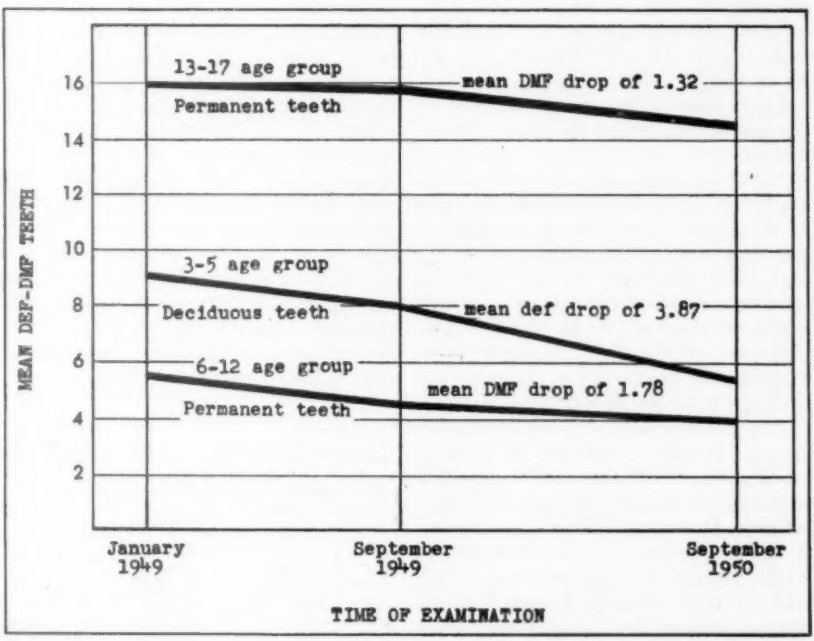



*Fig. 3 • Askov: mean def-DMF teeth (January 1949 - September 1950)*

**Table 5** • Results of five Askov diet studies as judged by postdiet *L. acidophilus* counts

| Diet study beginning date | Number in study | Postdiet *L. acidophilus* counts below 10,000 | |
|---|---|---|---|
| | | Number | Per cent |
| April 25, 1949 | 21 | 8 | 38.1 |
| May 16, 1949 | 10 | 4 | 40.0 |
| January 25, 1950 | 22 | 13 | 59.1 |
| April 12, 1950 | 12 | 3 | 25.1 |
| October 23, 1950 | 74 | 27 | 36.5 |
| Total | 139 | 55 | 39.5 |

program for the same three years has been just under $1 per individual per year. The cost of the topical fluoride treatment per treated child, including the fees paid the dentist, the services of the dental hygienist and material, is approximately $4. The cost of the various phases of the program was more in the first year; but as the dentists became adapted to the program, the cost has gradually been reduced. The dentists have reduced the time needed for examinations and for giving the fluoride treatment.

Some observations on the attitude of the people affected by the program were desired so it was decided to conduct a personal opinion survey. The purpose of the survey was to determine the thinking of the people concerning the demonstration and to determine what problems, if any, have developed. A dental health adviser from the division of dental health contacted heads of 173 families in Askov and the neighboring communities of Kerrick and Bruno, whose children also are eligible for the dental program.

The families were divided into three groups. Group 1 consisted of families participating in all phases of the program including prevention, education and dental care; Group 2, families participating in the prevention and education phases of the program but not receiving dental care for their children; Group 3, families not participating in any phase of the program. This survey covers approximately 381 children from 3 to 17 years of age. The average number of children per family varied slightly according to group classification. Group 1 showed 2.1 children per family; group 2, 2.75 children per family; and Group 3, 3 plus children per family.

Of the 173 families contacted, more than 97 per cent were taking part in the preventive and educational phases of the program, while approximately 85 per cent of the total group were receiving dental care. Only 2.9 per cent of the group stated they were not interested in the program, some of them for financial reasons. Only seven families desired a loan from the community fund to assist in paying their dental fees. This speaks well for the community and shows that the public is willing to pay its own way for dental health.

The attitude of the people toward the program as a whole was excellent. Some people objected to the fees for services, but the same people expressed approval of the program. Seventy per cent of the total group stated that they were well informed on the procedures of the program, 20 per cent made no comments while 5 per cent stated that they did not know enough about the program. Personal comments by members of the various families showed that there was much interest in the diet program and the lactobacillus counts. The interviews also showed that the grandparents had considerable influence on the parents and their children and in many cases were the chief handicap in diet control.

**Table 6** • Study of the changes in the lactobacillus counts of 74 Askov children signed up for a seven weeks restricted carbohydrate diet, October 23—December 11, 1950

| | Low *L. acidophilus* count (less than 10,000) | Moderate *L. acidophilus* count (10,000-49,999) | High *L. acidophilus* count (50,000 and up) |
|---|---|---|---|
| Prediet | 0 | 40.5% | 59.5% |
| Postdiet | 36.5% | 28.4% | 35.1% |

SUMMARY

The Askov dental demonstration is showing the values of a community dental health program. The greatest benefits derived from the program are revealed in the 3 to 5 year age group, which at present shows more than 41 per cent reduction in dental caries in deciduous teeth. A smaller reduction is revealed in the permanent teeth of the 6 to 12 year age group. This group has 10 per cent more caries-free individuals at the end of three years than at the beginning of the program. No significant reduction is apparent in the 13 to 17 year age group at present.

The value of bitewing roentgenograms as a routine part of the dental examination has been demonstrated. Without roentgenograms the dentists missed 24 per cent of the carious surfaces.

The use of the lactobacillus count has proved a valuable means of promoting dental health education among the parents as well as among the children. The program has increased the percentage of children in the low count from 27 per cent in 1948 to 48.9 in 1950.

Group diet control has met with partial success. This phase of the program presented problems that as yet have not been solved. Only the most cooperative patients and parents showed results on the diet control.

The toothbrush drill in the school has proved another aid to dental health education. Carrying on a proper brushing technic at the proper time is a means of teaching good oral hygiene. The child learns by doing. The educator realizes the value of this procedure.

The town of Askov has no communal water supply, so it cannot benefit from the central fluoridation of water. However, the topical application of fluoride to the erupted teeth assumes an important part in the demonstration. Children of the age groups 3, 7, 10 and 13 are treated each year on four consecutive days with applications of a 2 per cent solution of sodium fluoride. The treatment, applied by the participating dentist, is costing about $4 per treated child.

Table 7 • Expenditures on the Askov dental program for three years, October 1948-June 30, 1951

| Expenditures | Period ending | | |
|---|---|---|---|
| | June 30, 1949 | June 30, 1950 | June 30, 1951 |
| Salaries | | | |
| Dental assistant—full time | $1,260.00 | $1,969.00 | $2,220.00 |
| Bacteriology aide—⅓ time | 714.00 | 955.89 | 995.48 |
| Public health dentist—part time | 881.55 | 535.00 | 465.00 |
| Dental health adviser—part time | | | |
| Participating dentists' fees @ $8 per hour | 1,578.00 | 936.00 | 657.48 |
| Fees for corrective services | 3,098.50 | 3,310.50 | 1,936.75 |
| Travel | 86.00 | 52.55 | 10.97 |
| Training courses | | | |
| Dentists—University of Minnesota, School of Dentistry | 648.00 | | |
| Bacteriology aide—University of Michigan | 115.40 | | |
| Askov community | | | |
| Remodeling—utilities | 1,125.25 | 193.66 | 121.99 |
| Dental equipment | 4,180.77 | | |
| Dental supplies | | | |
| Instruments—material | 806.81 | 388.36 | 298.46 |
| Lactobacillus laboratory supplies | 250.70 | 507.94 | 15.03 |
| Toothbrushes and dentifrice | 327.60 | 366.85 | 169.90 |
| Office equipment and supplies | 513.90 | 93.83 | 36.46 |
| Repairs | | 2.80 | |
| | $15,586.48 | $9,312.38 | $6,927.52 |

This phase of the program has contributed greatly to acquainting the very young children with dental office procedures.

The necessary equipment, the remodeling of the dental office, the instruments, office furnishings, supplies, salaries and services during the first year cost approximately $45 per eligible child. The second year cost was $26.50 per child; the third year cost was reduced to $23 per eligible child. According to the cost of the first three years, the combined preventive features, including examination, fluoride treatment, *L. acidophilus* counts, control diet, toothbrushes and dentifrice averaged about $10 per child per year. The first two years showed a large cost chargeable to dental corrections. The third year charges reveal that the backlog of dental needs is being reduced considerably. Eighty-five per cent of the eligible children are participating in the dental care phase of the program.

The attitude and interest of the parents in regard to the program are excellent. A survey of 173 families showed that the people desired to finance their own dental needs. By their cooperation and participation they manifested their wish for a community dental program. Many phases of this program bring the parent into direct contact with the dentist, the teacher and public health personnel and thus provide an excellent opportunity for adult dental health education.

Further study is to be devoted to classroom dental health work and its adaption to the present curriculum. The little work that has been done in this field reveals that the educator is most receptive to an educational program that will bring the teaching of dental health into the regularly scheduled classroom work.

At the end of its first three years the 10-year study is already demonstrating the benefits to be derived from a community dental health program.

*Success* • Success in the practice of dentistry is obtained very much like character is built—by continual study, by building step by step, by consulting with others who have already reached the goal in some particular field. Henry Ward Beecher said, "Character is built as cathedrals are built—the part nearest the ground finished, but the part which soars to heaven, the turrets and the spires, forever incomplete." As dentists, we can never hope for perfection but we can climb higher and higher. . . ." *M. H. Garvin, Journal of the Canadian Dental Association, May 1952.*

# Effects of function on healthy teeth: the evidence of ancient Athenian remains

*George G. Philippas, D.D.S., M.S.D., Athens, Greece*

Researches on diseases of the teeth and their investing tissues have been carried out chiefly on contemporary individuals and experimental animals. Some investigators believe that the study of material belonging to past epochs may also help in the solution of present day problems. Consequently, they have turned to the examination of skeletal remains and the remains of skulls, jaws and teeth of people who lived in times remote from ours. The circumstances under which some ancient peoples lived, being different from those of civilized man today, but similar to those found among existing native races and tribes, may have resulted in dental conditions which throw light on fundamental physiologic and pathologic processes now obscured by modern ways of living.

Among the ancient skeletal materials found and examined up to date, a prominent position is held by those from the archeological excavations in Greece. Although the data relating to the dental system are somewhat limited in character, investigators agree that ancient, prehistoric and primitive people suffered, though in a considerably lesser degree, from the same diseases that affect modern civilized races. Everyone who examines these remains of early man invariably observes that they reveal certain common features characteristic of the age and the epoch to which the particular material belongs. That is to say, in the Grecian specimens mentioned the investigator finds extensive occlusal or incisal and proximal wear with excellent appearance of contact relation and investing bone. Generally, the whole dental system shows a considerable freedom from decay and gingivitis which as a rule is not to be observed in present every-day practice.

The question arises, what detailed changes took place in the dental system of ancient man? What role did those biological changes play in helping to preserve the immunity of the teeth in early times? This problem furnished the reason that the author, with the cooperation of the archeologist, A. A. Papagiannopoulos-Palaios, undertook the detailed examination of the jaws and teeth recovered from the archeological excavations in Greece and preserved in various museums. The material for this particular study was limited to that found in the ancient Athenian Agora,[1] or market place, located near the Acropolis, which was the center of the civilized world in early times. This material was chosen

The interpretation of the material was reviewed by G. R. Lundquist, D.D.S., M.S.D., professor of oral pathology, Northwestern University Dental School, Chicago.

1. The excavations of the ancient Agora have been carried on since 1931 by the American School of Classical Studies.

because of the excellent and reliable chronological and skeletological classification of J. L. Angel[2] and because it was representative of nearly the entire span of time from the Neolithic period to the period of Turkish domination, representative of persons of all ages who lived in periods distant from one another, but in the same region and under conditions prevalent during each period, and—what is essential—far from any kind of dental care.

## METHOD OF EXAMINATION

Before any examination of the teeth and investing hard tissues, the specimens were cleaned of the accumulated debris and also of any adhesive material used during the first cleaning and repair of skeletons,[3] which either adhered to the crowns of the teeth or filled their interproximal spaces. This work was done carefully and with the help of special delicate scalers and toothbrushes of different shapes and hardness.

At least two actual size, close-up photographs were taken, one from the occlusal aspect of the left second bicuspid and first molar of the lower jaw, which also included the second and third molars of the same side. In cases where these teeth were missing on the left side, the photographs were taken of the corresponding right side. A millimeter scale placed at the level of the occlusal surface and the identifying serial number of the Agora Museum were also photographed for each specimen. Another photograph of the same region was taken from the buccal aspect centered to the interproximal space between the second bicuspid and permanent first molar. Here again a small millimeter scale was photographed which was placed parallel to the buccal surface and over the occlusal surface in such a way as to coincide with the center of the contact point or contacting surface of the teeth, as the case might be. Similar photographs were taken for younger individuals to illustrate the deciduous second and permanent first molar region. These were supplemented with full mouth photographs of the occlusal aspect.

These photographs were taken in order to make the following measurements:

1. The length of the crown from the occlusal surface to the cementoenamel junction and from that point to the alveolar ridge.
2. The degree of occlusal wear.
3. The proximal wear and the extension of the contact point or surface buccolingually and occlusogingivally.
4. The changes in the occlusobuccal and occlusolingual embrasures.
5. The height of the interproximal space of the second bicuspid and first molar from the most gingival point of the contact to the ridge of the alveolar process.

The photographs and measurements were also used to study the probable relations existing and the changes which had taken place in the relations of tooth surfaces and alveolar process in the vicinity of the interproximal space between the bicuspid and molar.

Each specimen was given a thorough visual examination with the help of explorers, magnifying glass and a millimeter scale.

Since the visual examination alone was not sufficient, because of the nature of the material and its defective preservation, roentgenograms were made to supplement clinical inspection. Roentgenograms were taken in all instances from the same angle and distance and from the same side of the left second bicuspid and first molar of the lower jaw. This region was chosen since it is considered most susceptible to destruction of

2. Angel, J. L. Greek teeth ancient and modern. Human Biology 16:285 (Dec.) 1944.

3. Angel, J. L. Skeletal material from Attica. Hesperia 5:289 (Oct.-Dec.) 1945.

the underlying tissues of the teeth.[4] The second and third molars were also included in the roentgenogram. In some cases in which the left side was missing or damaged, roentgenograms were taken of the right side.

The roentgenograms were used to discover:

1. The relation of the cementoenamel junction of the tooth to the proximal alveolar crest, in persons of different ages throughout the time when occlusal wear was taking place.

2. The degree of deposition of secondary dentin and the width of the pulp chamber and root canals.

3. The amount of deposition of cementum.

4. The condition of the lamina dura, and the degree of resorption or recession of the alveolar margin, and the condition of other periapical tissues.

Roentgenograms were also made: (1) in doubtful cases to ascertain the existence of decay; (2) to ascertain destruction of the alveolar margins in doubtful cases of gingivitis or periodontitis; (3) in doubtful cases of noneruption of third molars, upper cuspids and lateral incisors, to determine whether they were impacted or congenitally absent; (4) to determine the degree of resorption of the roots of the deciduous teeth and the degree of calcification of the roots of the permanent teeth, and thus to determine more accurately the age at death of each subject.

By comparison of the photographs and the roentgenograms, it was possible to obtain a more accurate and actual picture of the relation and reciprocal influence of the biological changes and alterations that take place in various cases, of different ages and varying degrees of occlusal and proximal wear, of migration of teeth, of a modified form of continuous eruption of the teeth, and of the formation of cementum.

Thus, with these means, each specimen was studied without knowledge beforehand as to the period to which the case belonged, in order to avoid bias.

The wear of the occlusal surface of the teeth today is usually observable in persons who are about 40 years old and is considered a normal phenomenon. Wear beyond a certain point may be considered as a pathological phenomenon of unknown etiology, and then may be called abrasion. This abrasion may be observed in the teeth of a limited number of persons of all ages, and even in the deciduous teeth. The development of the different stages of wear of the occlusal surfaces of the teeth of contemporary persons is described generally by Black.[5]

This phenomenon of wear and abrasion is observed on the teeth of ancient man in varying degrees. Investigators who have studied this subject have employed different but related methods of measurement. M. S. Senyurek[6] used the method of measurement first applied by Broca (1875-1879), which was followed by other investigators until 1931. This method distinguishes the different phases of occlusal wear from Degree I (that is, where no trace of wear is observed) to Degree V (where the abrasion extends to the neck of the tooth). J. L. Angel[2] indicates the degrees of wear as None, Slight, Medium, Pronounced and Extreme.

The degree of wear and abrasion varied from mouth to mouth and among the teeth of the same mouth as might be expected. Although the amount of wear was assessed for all the teeth of every mouth, each mouth was classified according to the wear of the permanent first molar and, where that tooth was lacking, according to the wear of the

4. Marshall-Day, C. D., and Shourie, K. L. A roentgenographic survey of periodontal disease in India. J.A.D.A. 39:578 (Nov.) 1949.

5. Black, G. V. Operative dentistry, vol. I, ed. 7. Chicago, Medico-dental Publishing Co., 1936, p. 39, 316.

6. Senyurek, M. S. The attrition of molars in the ancient inhabitants of Anatolia. Bulletin Cilt 13, Sayi 50 (Nisaw 1949) day ayribasin, Ankara, 1949, p. 238.

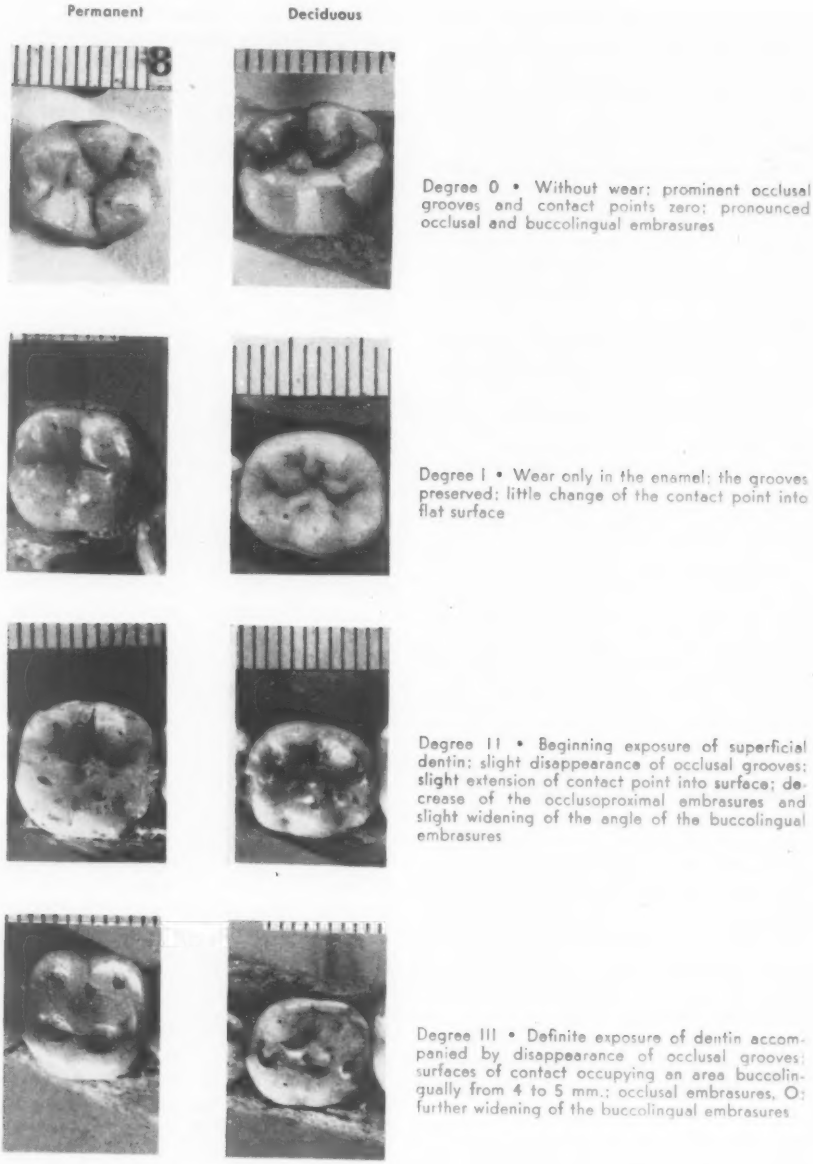
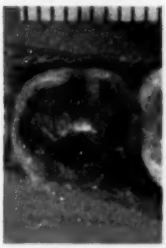
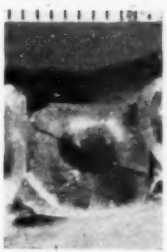
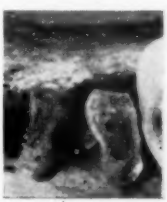

Permanent
Deciduous
Degree 0 • Without wear; prominent occlusal grooves and contact points zero; pronounced occlusal and buccolingual embrasures
Degree I • Wear only in the enamel; the grooves preserved; little change of the contact point into flat surface
Degree II • Beginning exposure of superficial dentin; slight disappearance of occlusal grooves; slight extension of contact point into surface; decrease of the occlusoproximal embrasures and slight widening of the angle of the buccolingual embrasures
Degree III • Definite exposure of dentin accompanied by disappearance of occlusal grooves; surfaces of contact occupying an area buccolingually from 4 to 5 mm.; occlusal embrasures, O; further widening of the buccolingual embrasures

*Fig. 1 • Series of typical cases at different stages*

| | Permanent | Deciduous |
|---|---|---|
| Degree IV • Pronounced exposure of dentin; some remains of enamel preserved; contact surfaces and occlusoproximal and buccolingual embrasures approximately as in Degree III | |  |
| Degree V • Complete exposure of dentin without exposure of pulp horns; from this degree through Degree VIII, decrease of extension buccolingually of the contact point up to its entire disappearance, and change of the angle of the buccolingual embrasure | | |
| Degree VI • Complete exposure of dentin with exposure of pulp horns | | |
| Degree VII • Complete exposure of pulp chamber |  | |
| Degree VIII • Further extension of abrasion beyond the floor of pulp chamber; separation of roots |  | |

deciduous second molar. The permanent first molar was selected because it is usually the first permanent tooth to erupt, has the longest life, and usually suffers the greatest wear. Because of its morphology it also affords a clear picture of the wear phenomenon.

The assessment of wear was made in accordance with a series of typical cases at different stages (Fig. 1).

## FUNCTIONAL EFFECTS

The material examined in the excavations of the Agora of Athens furnishes considerable data (see Tables 1, 2, 3 and 4), which suggest some interesting interpretations that could influence the management of the teeth and their investing tissues today. In general, the degree of wear exhibited on the occlusal and the proximal surfaces of both the deciduous and permanent teeth corresponds to the ages of the individuals included in this study. Accordingly, more recently erupted teeth showed less wear than those which had been in functional occlusion for some time. However, the same age groups showed some variation in the degree of wear, which is to be expected with human material.

In jaws free from pathology, as the teeth move towards their opponents, the distance from the occlusal surface of the tooth to the crest of the alveolar process remains approximately the same regardless of the age of the individual. For example, Figure 2 depicts the mouth of a child 6 years of age. The distance from the occlusal surface (tips of cusps in buccal view) to the crest of the alveolar process is 7.5 mm. There is no evidence of wear, the permanent first molar having recently erupted. Figure 3 illustrates progressive wear in the mouth of a person approximately 25 years old, with a

**Table 1** • Number of specimens by historic periods

| | | Neolithic | Mycenaean | Geometric | Archaic | 400–150 B.C. | Roman | Byzantine | Turkish | Total | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper and lower jaws | M | 0 | 2 | 5 | 5 | 0 | 2 | 0 | 4 | 18 | |
| | F | 0 | 3 | 7 | 4 | 0 | 3 | 0 | 2 | 19 | |
| | Ch | 0 | 2 | 2 | 0 | 1 | 3 | 1 | 1 | 10 | |
| | ? | 0 | 3 | 0 | 0 | 5 | 1 | 0 | 0 | 9 | 56 |
| Upper jaw only | M | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 4 | |
| | F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | |
| | Ch | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | |
| | ? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| Lower jaw only | M | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 4 | |
| | F | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 3 | |
| | Ch | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | |
| | ? | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 11 |
| Teeth only | M | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | |
| | F | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | |
| | Ch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | ? | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 5 |
| Total | M | 1 | 3 | 6 | 7 | 1 | 2 | 0 | 7 | 27 | |
| | F | 0 | 3 | 7 | 8 | 0 | 3 | 0 | 6 | 27 | |
| | Ch | 3 | 2 | 2 | 0 | 1 | 3 | 3 | 1 | 15 | |
| | ? | 0 | 3 | 0 | 0 | 7 | 1 | 1 | 0 | 12 | |
| Grand total | | 4 | 11 | 15 | 15 | 9 | 9 | 4 | 14 | | 81 |

M, male; F, female; Ch, child; ?, sex doubtful.

measurement from occlusal surface to alveolar crest of 7.5 mm. It should be noted, however, that the actual anatomic crown length (that is, from the occlusal surface to the cementoenamel junction) measures but 5 mm.

Figure 4 illustrates the degree of excessive wear which was commonly found in the mouths of individuals of the approximate age range of 40 to 50 years. Here again the occlusoalveolar distance is nearly the same—that is, 7 mm.—although the wear has extended almost to the cementoenamel junction. This and the fact that all teeth in occlusion tended to assume the same occlusal level illustrate nicely nature's compensation for wear by an occlusally directed movement of teeth, or vice versa.

Mesial drift, or a mesial direction movement, of molar teeth is illustrated in a 6 year old child (Fig. 2). It also shows a ball point contact above which is an occlusal embrasure with a height of 1.5 mm. and a slight flare to the buccal and lingual surfaces.

The teeth of a 25 year old person (Fig. 3) illustrate wear that has eliminated the occlusal embrasure, as such, and that has developed an increase in the buccolingual contact surface to 4 to 4.5 mm. The flare of the buccal and lingual embrasures has also increased with increase in the proximal contact surface. The contact surface is also broadened occlusogingivally so that it measures 3 mm. in the representative case. Such a broad contact is illustrated in Figure 5.

Table 2 • Measurements of permanent teeth: second bicuspid and permanent first molar

| No. of skull | Age years | Degree of occlusal wear | Length of crown | Length to cemento-enamel junction | Cemento-enamel junction to alveolar bone | Occlusal embrasure | Contact occluso-gingivally | Contact bucco-lingually | Gingival of contact to alveolar crest |
|---|---|---|---|---|---|---|---|---|---|
| 45aa | 20 | 2 | 7.5 | 6.5 | 1.0 | 0.5 | 2.5 | 3.0 | 3.0 |
| 74aa | 16 | 2 | 7.5 | 6.5 | 1.0 | 1.5 | 1.5 | 1.5 | 3.0 |
| 73aa | 18 | 2 | 7.0 | 6.0 | 1.0 | 0.5 | 1.5 | 3.0 | 3.0 |
| 50aa | 24 | 2 | 7.5 | 6.5 | 1.0 | 0.5 | 2.0 | 4.0 | 3.0 |
| 57aa | 18 | 2 | 7.5 | 6.5 | 1.0 | 1.0 | 2.0 | 2.0 | 3.0 |
| 64aa | 15 | 2 | 7.5 | 6.5 | 1.0 | 0.5 | 2.5 | 3.0 | 3.0 |
| 76aa | 32 | 2 | 8.0* | 6.5 | 1.5 | 1.0 | 2.0 | 3.5 | 3.0 |
| 72aa | 20 | 2 | 7.5 | 6.0 | 1.5 | 1.0 | 2.5 | 3.0 | 3.0 |
| 43aa | 22 | 2 | 8.0* | 6.5 | 1.5 | 1.0 | 2.5 | 3.0 | 3.0 |
| 7aa | 19 | 2 | 8.0* | 6.5 | 1.5 | 0.5 | 2.5 | 3.5 | 3.0 |
| 16aa | 18 | 2 | 7.5 | 6.5 | 1.0 | 1.5 | 2.0 | 3.0 | 3.0 |
| 41aa | 43 | 3 | 11.0* | 6.5 | 4.5 | 1.0 | 3.0 | 4.0 | 4.0 |
| 9aa | 25 | 3 | 6.5 | 5.0 | 1.5 | 0.0 | 2.5 | 4.0 | 2.5 |
| 12aa | 25 | 3 | 7.5 | 5.0 | 2.5 | 0.0 | 3.0 | 4.5 | 3.0 |
| 20aa | 30 | 3 | 7.5 | 5.0 | 2.5 | 0.0 | 2.5 | 3.0 | 3.5† |
| 69aa | 39 | 3 | 8.5* | 5.0 | 3.5 | 0.0 | 2.0 | 3.0 | 5.0† |
| 5aa | 25 | 3 | 8.5* | 6.5 | 2.0 | 0.5 | 2.5 | 2.5 | 3.0 |
| 98aa | 30 | 4 | 10.5* | 5.5 | 5.0 | 0.0 | 3.0 | 4.0 | 3.0 |
| 40aa | 36 | 4 | 9.0* | 5.0 | 4.0 | 0.0 | 2.5 | 4.0 | 3.0 |
| 19aa | 33 | 4 | 7.0 | 3.5 | 3.5 | 0.0 | 2.0 | 4.0 | 3.0 |
| 48aa | 40 | 4 | 8.5* | 4.0 | 4.5 | 0.0 | 1.5 | 4.0 | 5.5 |
| 14aa | 38 | 4 | 7.0 | 3.5 | 3.5 | 0.0 | 2.5 | 3.5 | 3.5 |
| 60aa | 50 | 4 | 7.0 | 4.0 | 3.0 | 0.0 | 1.5 | 4.0 | 3.0 |
| 61aa | 45 | 4 | 8.0* | 4.0 | 4.0 | 0.0 | 2.5 | 4.0 | 3.0 |
| 13aa | 30 | 4 | 7.5 | 4.0 | 3.5 | 0.0 | 2.0 | 3.5 | 3.0 |
| 6aa | 40 | 5 | 8.0* | 4.0 | 4.0 | 0.0 | 2.0 | 3.5 | 3.0 |
| 70aa | 34 | 5 | 7.0 | 1.0 | 6.0 | 0.0 | 1.0 | 3.0 | 3.0 |
| 3aa | 40 | 7 | 9.0* | 0.0 | 6.0 | 0.0 | 0.5 | 2.5 | 3.0 |
| 5aa | 35 | 8 | 7.0 | .. | .. | .. | .. | .. | 3.0‡ |

*Measurements above 7.5 mm. indicate disease or destruction postmortem.
†Calculus present indicative of periodontal disease.
‡Estimated.

**Table 3** • Measurements of deciduous teeth: first and second deciduous molar

| No. of skull | Age years | Degree of occlusal wear | Length of crown | Length to cemento-enamel junction | Cemento-enamel junction to alveolar bone | Occlusal embrasure | Contact occluso-gingivally | Contact bucco-lingually | Gingival of contact to alveolar crest |
|---|---|---|---|---|---|---|---|---|---|
| 80' | 4 | 0 | 7.5 | 7.0 | 0.5 | 1.0 | 1.0 | 1.5 | 2.5 |
| 78 | 5½ | 1 | 7.0 | 6.5 | 0.5 | 1.0 | 3.0 | 3.0 | 2.5 |
| H' | 6-7 | 1 | 7.5 | 6.5 | 1.0 | 1.5 | 1.0 | 1.0 | 3.0 |
| 33aa | 6½ | 2 | 6.5 | 6.0 | 0.5 | 1.0 | 2.0 | 2.0 | 2.5 |
| 49aa | 6 | 2 | | | | | | | |
| 80²aa | 7½ | 2 | 7.5 | 6.0 | 1.5 | 0.5 | 2.0 | 2.5 | 2.5 |
| 77aa | 8½ | 2 | 6.5 | 6.0 | 1.0 | 0.5 | 2.5 | 3.5 | 2.5 |
| 46aa | 9 | 3 | 6.5 | 5.0 | 1.5 | 0.5 | 2.5 | 3.0 | 2.5 |
| 59aa | 13 | 3 | 6.5 | 5.0 | 1.5 | 0.5 | 2.5 | 2.5 | 2.5 |
| 31aa | 9 | 4 | 6.5 | 4.0 | 2.5 | 0.0 | 3.0 | 4.0 | 2.5 |
| 4aa | 10 | 4 | 6.5 | 4.0 | 2.5 | 0.0 | 3.0 | 4.0 | 2.5 |
| 25aa | 7-8 | 5 | 6.5 | 4.5 | 2.0 | 0.0 | 2.5 | 4.5 | 2.5 |

The well-abraded tooth with an age range of the subject from 40 to 50 years, as illustrated in Figure 4 reveals a reduction in contact surface width buccolingually to 3 mm., while in the occlusogingival direction it measures 1 mm. This conforms to the drift and pattern of wear of these teeth. Obviously, when occlusal and mesial movements of the teeth occur, a compensatory reduction of occlusal height and mesiodistal breadth of the anatomic crown takes place. Therefore, as the functional occlusal surface approaches the gingival, and the anatomic crown is reduced in height and mesiodistal width, the contact surface becomes neither so broad buccolingually or occlusogingivally as in the 25 year old individual exemplified in Figure 3. In this latter case, the greatest buccolingual and occlusogingival contours of the anatomic crown are involved, and hence the broad contact surface described. However, while the measurements of the contact surface in Figure 4 are reduced below those in Figure 3 yet they are substantially larger than those in Figure 2 where a ball point exists. If a case such as that in Figure 4 is abraded beyond this stage, no contact would remain and a separation of the roots would occur. Such a situation is represented in Figure 1 (Degree VIII).

In the cases represented in Figures 2, 3 and 4, the interproximal measurements from the gingival base of the contact surface or point to the crest of the septal alveolar bone ranges from 2.5 to 3 mm.;

**Table 4** • Measurements of permanent and deciduous teeth: second deciduous molar and first permanent molar

| No. of skull | Age years | Degree of occlusal wear | | Length of crown | Length to cemento-enamel junction | Cemento-enamel junction to alveolar bone | Occlusal embrasure | Contact occluso-gingivally | Contact bucco-lingually | Gingival of contact to alveolar crest |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Dec. | Perm. | | | | | | | |
| 80²aa | 7½ | 2 | 0 | 7.5 | 6.5 | 1.0 | 1.5 | 1.0 | 1.5 | 3.0 |
| 77aa | 8½ | 2 | 1 | 7.5 | 6.0 | 1.5 | 1.0 | 1.5 | 2.0 | 3.0 |
| 46aa | 9 | 3 | 2 | 6.0 | 6.0 | 0.0 | 0.5 | 2.5 | 3.0 | 2.5 |
| 59aa | 13 | 3 | 2 | 7.5 | 6.0 | 1.5 | 0.5 | 2.5 | 2.0 | 3.0 |
| 31aa | 9 | 4 | 2 | 7.0 | 6.0 | 1.0 | 0.5 | 2.5 | 4.0 | 2.5 |
| 4aa | 10 | 4 | 2 | 7.0 | 6.0 | 1.0 | 0.5 | 2.5 | 4.0 | 2.5 |
| 25aa | 7-8 | 5 | 1 | 7.0 | 6.0 | 1.0 | 0.5 | 2.5 | 4.0 | 2.5 |

A B C

*Figure 2*

*Figure 3*

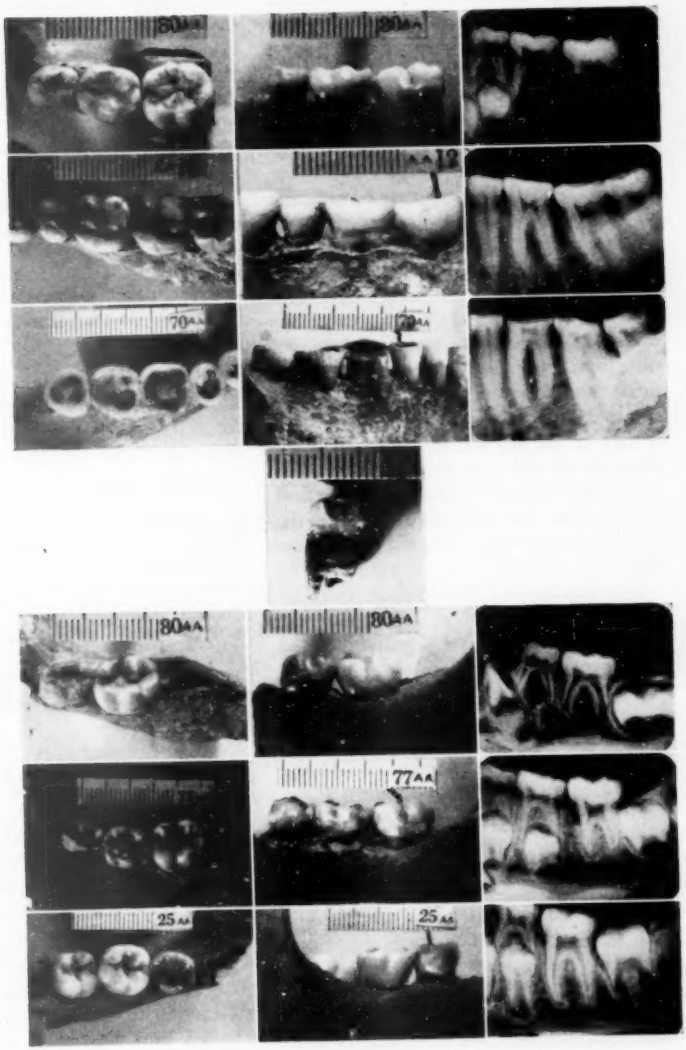
*Figure 4*

*Figure 5*

*Figure 6*

*Figure 7*

*Figure 8*



that is, they are nearly identical. This fact demonstrates that in healthy well-worn dentures, the vertical height of the septal space remains relatively the same for all ages. As a result, it may be concluded that excessive functional factors of occlusion may be as important in explaining the degree of wear of teeth as is the wear that accompanies age, or the time which has elapsed since the eruption of the individual teeth.

Roentgenographic evidence indicates that recently erupted teeth have relatively longer anatomic crowns and shorter roots than those teeth which have been in occlusion for some time and which have been subject to wear. As these well-worn teeth move in an occlusal direction, maintaining the proper vertical dimension, their crowns are shortened while cementum apposition occurs in the apical region so that excessively abraded permanent first molars have approximately the same vertical height from the occlusal surface to the apex as have recently erupted first molars (Fig. 2C, 7C, 8C).

The deciduous molars exhibit a similar pattern of wear (Fig. 6-8) as they, too, demonstrate an occlusally directed movement with constant relationship of occlusal surface to alveolar crest as above described, with an average normal vertical height. Figure 6 shows the lack of wear in newly erupted deciduous teeth; moderate wear is present in Figure 7 and there is excessive wear in Figure 8. All the deciduous teeth occupy the same occlusal level that is exhibited for the adjoining permanent first molars. However, they differ in terms of function in that the roots do not have additions made in the apical region as in the permanent dentition. The reverse is true in these cases, for the apical ends of the roots are resorbed as the deciduous dention is replaced by the permanent dentition.

Roentgenographic evidence reveals the fact that recently erupted teeth (Fig. 2, 7, 8) have relatively larger pulp chambers and root canals than have teeth which have been erupted and have functioned in occlusion for some time (Fig. 3, 4). The age factor would probably better explain the encroachment on pulp tissue by progressive calcification from all directions than would the functional factor of wear. However, excessive wear, no doubt, influences the degree of calcification to some extent.

The following conclusions might be drawn from the foregoing study:

1. Age is perhaps the dominant factor in explaining the degree of wear although functional factors may be of equal importance.

2. The length of the clinical crown—that is, the occlusoalveolar crest relationship—is constant except in pathologic cases, and it approximates 7.5 mm.

3. The original length of the anatomic crown (occlusal surface to cementoenamel junction) is approximately 6.5 mm. and this may be reduced to zero or minus, with a separation of the roots, by occlusal wear.

4. The distance from the cementoenamel junction to the crest of the bone ranges from 1.5 mm. to 6 mm. in nonpathologic cases.

5. The occlusal embrasures, measuring 1.5 mm. originally, decrease rapidly and disappear at about 25 years on the average.

6. The height of the septal space from the base of the contact surface to the alveolar crest remains constant in nonpathologic cases and approximately 3 mm., until the contact is destroyed.

7. The contact surface buccolingually, originally 2 to 3 mm., increases to from 4 to 4.5 mm. and then is progressively reduced.

8. The contact surface occlusogingivally, originally 1.5 to 2.5 mm., increases to approximately 3 mm. and then is

progressively reduced until it reaches zero and disappears.

9. Newly erupted teeth have relatively longer anatomic crowns and shorter roots than have teeth that have been in occlusion for some time and subject to excessive wear. Their over-all vertical height, however, is approximately equal.

10. With age, progressive calcification tends to narrow the diameter of the pulp chambers and of the root canals.

11. Throughout the life history of the functional tooth an approximately constant relation is maintained between the position of the functional occlusal surfaces, the proximal surfaces and the investing tissues. This balance probably contributes to maintaining a healthy condition of the jaws.

*9 Hippocratous*

# Some orthodontic aspects of general practice

*Faustin N. Weber, D.D.S., M.S., Memphis, Tenn.*

The House of Delegates of the American Dental Association has adopted four principles[1] which it maintains should govern all dental health program planning. A summary of the principles is as follows:

1. Research which may lead to the prevention or control of dental diseases should be encouraged.

2. Dental health education should be included in all basic educational and treatment programs for children and adults.

3. (*a*) Dental care should be available to all regardless of income or geographic location. (*b*) Programs developed for dental care should be based on the prevention and control of dental diseases. (*c*) Dental health is the responsibility of the individual, the family and the community, in that order.

4. Authorized representatives of the American Dental Association should participate in all conferences that may lead to the formation of a plan for dental research, dental health education and dental care.

In two of these four basic principles, prevention of dental disease is recognized and emphasized as an important element in any dental health program.

## THE ROLE OF PREVENTIVE HEALTH SERVICES

A logical approach to the solution of the dental health problem may be to alter the health conditions of the people of the United States so that less medical and dental care is required rather than to attempt to finance, through additional taxation, another costly and ineffectual

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1. American Dental Association. Compulsory health insurance is not the answer. J.A.D.A. 38:512 (April, Sect. 2) 1949.

federal program. A preventive health service can be dispensed to a greater mass of people and it will be much less costly than to supply corrective therapy to the same size group.

The methods available for the practice of preventive medicine and dentistry have become increasingly effective in recent years. In orthodontics, enough is known about the causes of malocclusion to provide effective technics for preventing some types of dentofacial abnormalities, yet few general practitioners practice prophylactic orthodontics.

## PREVENTIVE ORTHODONTICS IN GENERAL PRACTICE

The practice of preventive orthodontics is the responsibility of the general practitioner of dentistry as well as the specialist.

The orthodontist seldom sees a patient at a period when prophylactic technics are applicable; corrective rather than preventive service is sought by the patients coming to the specialist.

The general practitioner, because of his early contact with the child patient, has a better opportunity to observe potential orthodontic difficulties during the critical years when malocclusions are likely to develop and preventive measures can be applied beneficially.

A survey made by Brandhorst[2] on 100,000 St. Louis school children revealed that more than one half of the group had dentofacial abnormalities and that 81 per cent of these malocclusions could have been prevented. Moore[3] believes that prophylactic orthodontic technics have a place in the general practice of dentistry and says, "A fair percentage of the cases of malocclusion now being treated could have been diminished in severity, checked at the start or prevented outright." Higley[4] is of the opinion that some serious dentofacial deformities can be minimized if the dentist has the ability to recognize incipient deformities.

## CHRONOLOGY OF THE DENTITION

A preventive orthodontic technic which may be applied frequently by the general practitioner with rewarding returns is the timely removal of deciduous teeth and the encouragement of the prompt eruption of succedaneous teeth. All orthodontic authorities include premature loss and over-retention of deciduous teeth, along with tardy eruption of permanent teeth, in their lists of the causes of dentofacial deformities. In some instances it may not be apparent whether the deciduous tooth is being retained too long or is being lost too early. Likewise, it may be difficult to decide whether or not a given permanent tooth is late in erupting.

Tables on the chronology of the deciduous and permanent dentitions give data which reveal the average chronologic age of the individual when the deciduous teeth erupt, the roots complete their calcification, the teeth are exfoliated and the permanent teeth erupt.

The information that comes from these tables is useful if applied with reason. It must be remembered that the chronologic age of an individual may be quite in advance of or behind his physiologic age. Eruption of deciduous or permanent teeth and exfoliation of deciduous teeth are physiologic processes and it is important to use additional sources of information before deciding the course to follow.

## CLINICAL OBSERVATIONS

The clinical examination is an important adjunct to the information supplied by

2. Brandhorst, O. W. Promoting normal development by maintaining the function of the deciduous teeth. J.A.D.A. 19:1196 (July) 1932.

3. Moore, G. R. Orthodontics. From outline of lecture delivered under the auspices of the Detroit Dental Society, December 8, 1936.

4. Higley, L. B. Preventive orthodontics. In Dentistry for children, Brauer, J. C., and others. Philadelphia, Blakiston Co., 1947, p. 76-155.

tables on the chronology of the dentition. The dentist can make observations which will help him to formulate a decision in doubtful cases. In order to know from the clinical examination whether or not a deciduous tooth is being retained too long, the following facts should be remembered: deciduous teeth on opposite sides of the dental arch are exfoliated at approximately the same time; similar permanent teeth on opposite sides of the dental arch erupt at the same time. Any pronounced lag in the shedding or in the eruption time of teeth on one side of the arch as compared with those on the opposite side should be viewed with suspicion and the region in question should be studied roentgenographically.

When deciduous teeth are retained past the time that their succedaneous teeth are erupted, it is apparent that the deciduous teeth have been over-retained. Immediate extraction of the deciduous tooth is indicated in such instances. The belief that allowing a deciduous tooth and its permanent successor to occupy the same dental area at the same time will stimulate jaw growth is without substantiation. In such cases the rule stated by Moore[3] is a good one to apply: "It is not good practice to permit a primary tooth and its permanent successor to be in evidence in the mouth at the same time. Exception: When congenital absence of one permanent tooth allows a primary tooth and its own permanent successor to erupt adjacently."

In all instances where a deciduous tooth is suspected of being retained too long and is to be extracted, it is mandatory that a roentgenogram of the region be taken to confirm the diagnosis. The roentgenogram is important because the presence or absence of a succedaneous tooth, the stage of its development and its proximity to eruption can be determined only in this manner. The roentgenograms may or may not confirm the clinical diagnosis.

Ectopic relations of the unerupted permanent teeth sometimes are the cause of retention of the deciduous teeth and noneruption of these permanent teeth. Uncoordinated resorption of the roots of deciduous teeth, such as the resorption of one root only of a multirooted tooth, may be a cause of retention of a deciduous tooth and account for the failure of its succedaneous tooth to erupt. Such conditions are recognizable in dental roentgenograms.

### ANKYLOSED DECIDUOUS TEETH

A previous report[5] stated:

> Another possible cause of too long retention of primary teeth is an ankylosis between the root and alveolar bone. These so-called "submerged" teeth are diagnosed from the clinical signs that reveal them to be short of the normal occlusal plane.
>
> Continued vertical growth of the adjacent teeth and their alveolar processes gives the impression that the ankylosed tooth is submerging. If these teeth are not exfoliated at the proper time their retention may favor the development of malocclusion. Careful observation of these teeth, with timely extraction when necessary, may well be a valuable type of prophylactic orthodontic service.

The progress of calcification of the roots of the unerupted permanent teeth and the degree of resorption of the roots of the deciduous teeth should be examined roentgenographically to decide either on a policy of immediate extraction of the deciduous teeth or of watchful waiting.

### SURGERY IN PREVENTION

In those instances where tardy eruption of permanent teeth cannot be accounted for by the ankylosis of deciduous teeth, the retention of deciduous teeth, the presence of supernumerary teeth or the ectopic relation of the permanent teeth themselves, it may be advisable to stimu-

5. Weber, F. N. The role of the general practitioner in orthodontics. J. Den. Children 17:22, 1st quart., 1950.

late their eruption before the adjacent teeth which have already erupted drift into the spaces required for normal positioning of the unerupted permanent teeth. This stimulation can be accomplished by a simple surgical technic which involves exposing the crown portions of the unerupted teeth.

The crown portion of the unerupted permanent tooth is exposed and a surgical cement dressing is inserted in the wound. The dressing is applied to prevent granulation tissue from forming over the exposed tooth surface before its eruptive process is initiated. In a week to 10 days following the surgery, peripheral healing of the wound will have advanced far enough to make it possible to remove the dressing without danger of the tissue reclosing over the exposed crown surface before the tooth begins to erupt.

An observant dentist will find a significant number of indications for applying this preventive technic. It can be applied most frequently in the region of the maxillary cuspid.

## PREMATURE LOSS OF DECIDUOUS TEETH

One of the controllable causes of malocclusion which is frequently encountered is the premature loss of deciduous teeth.

Brandhorst,[2] in his survey of St. Louis school children, found that premature loss of teeth accounted for 37 per cent of the malocclusions present in the group.

In most instances premature loss of deciduous teeth ultimately predisposes the individual to the development of malocclusion. There is only one region in the deciduous dentures where premature loss of teeth is not likely to be attended by malocclusion; that is the maxillary incisor region. In all other denture areas the untimely loss of deciduous teeth is a potential cause of dentofacial deformities of varying types and degrees.

The most vulnerable area for the development of malocclusion following too early loss of deciduous teeth is that of the second deciduous molar. An excessive anterior shift of the first permanent molar with loss of denture space for the bicuspids and cuspids is a usual sequela of premature loss of this tooth. Malocclusion follows the untimely loss of deciduous second molars with alarming consistency.

The observations made from a clinical survey[6] suggest that there is more potential danger of malocclusion developing from premature loss of maxillary deciduous molars than there is following the untimely loss of mandibular deciduous molars. This is so because, as Nance[7] observed from Black's[8] tables of tooth sizes, the average sum of the diameters of the deciduous cuspids and the first and second deciduous molars is in excess of that of the succeeding permanent cuspids and bicuspids by 1.7 mm. in the mandibular arch and 0.9 mm. in the maxillary arch. This means there is less leeway in the maxillary than the mandibular arch and the safe limits of anterior shifting of the first permanent molar are less in the upper than in the lower arch.

Since there is no interstitial growth of bone in the alveolar processes of the maxilla and mandible, it is important that no denture space anterior to the first permanent molar be lost beyond the extent of the leeway. If space is lost in excess of the leeway, the development of malocclusion in varying degrees is inevitable.

These types of malocclusions, which are the result of too early loss of deciduous teeth, are preventable. Since dental caries is the usual cause of premature loss of deciduous teeth, prevention logically

6. Weber, F. N. Prophylactic orthodontics. Am. J. Orthodont. 35:611 (Aug.) 1949.

7. Nance, H. N. The limitations of orthodontic treatment. Mixed dentition diagnosis and treatment. Am. J. Orthodont. & Oral Surg. 33:177 (April) 1947.

8. Black, G. V. Descriptive anatomy of the human teeth. Philadelphia, S. S. White Dental Mfg. Co., 1902, p. 17-18.

begins with the elimination or control of caries.

The second line of defense is the detection and prompt repair of all carious areas on deciduous teeth. If caries has already involved the pulp, extraction is not indicated necessarily because a pulpotomy may be advisable in appropriate cases.

If the deciduous tooth has reached a state which requires its untimely extraction, malocclusion can be prevented by applying the necessary treatment after careful observation of the region in question.

Observational technics are not adequate unless they provide the observer with exact information on the original extent of the space. It is necessary to know whether the space is opening, closing or remaining the same. Accurate impressions of the denture area involved should be taken and casts made therefrom which can be used on subsequent occasions in comparing the relations registered on the cast with those present in the oral cavity. Accurate measurements carefully made with a Boley millimeter gage provide an alternative method which is acceptable.

Nothing but continued observation is required in those cases where the space maintains or enlarges itself. A space maintainer of some type is necessary in those areas where the spatial loss reaches the limits of the leeway space.

## OPERATIVE DENTISTRY AND PREVENTIVE ORTHODONTICS

The dentist who uses the same exacting care in restoring the proximal and occlusal aspects of carious deciduous teeth that he employs in restoring permanent teeth is practicing a worth-while form of preventive orthodontics.

Too often the operator becomes careless about proper occlusal form and appropriate proximal extent of the restorations placed in deciduous teeth. The size of the coronal arch can be unfavorably modified by overextended or underextended proximal restorations which in turn may be the cause of establishing abnormal occlusal relations of deciduous as well as permanent posterior teeth.

Occlusal restorations that are without correct anatomic form also may predispose the teeth to undesirable shifting and be a cause of malocclusion. In this respect good operative dentistry is an aid in the practice of prophylactic orthodontics.

## CORRECTION AND PREVENTION OF MALOCCLUSION

The developing incisor cross-bite is one type of malocclusion that may be managed by the general practitioner. Its management will act as a form of preventive orthodontic therapy. There are many who support the theory that all cross-bite malocclusions should be corrected as soon as they are detected. The reason for recommending prompt intervention is that these malocclusions rarely are self-correcting and they have a tendency to develop into more complicated types of dentofacial anomalies.

Some orthodontists believe that cross-bites in the anterior region—particularly those involving all the incisor teeth—are a predisposing factor in the development of a Class III malocclusion.

The prophylactic benefit of treating incisor cross-bites at an early age is in the prevention of the development of more severe malocclusions.

The type of case that may be treated without difficulty by the general practitioner is one in which the vertical overbite of the incisors is not deep, the horizontal overjet is small, and there is space to permit labiolingual tipping of the incisor teeth. Several technics have been suggested to accomplish the objectives of treatment. The use of tongue depressor blades may be effective therapy if patient cooperation can be enlisted.

Massler and Suher[9] suggest the use of polystyrene in the construction of a bite plane in place of metal. This is a valuable modification of an old and frequently used appliance. Various technics that are simple to employ can be effective. For the treatment to be preventive as well as corrective, early detection and interception of the cross-bite malocclusion is essential.

### ECTOPIC ERUPTION

Ectopic eruption of permanent teeth is a biologic phenomenon that may be the cause of various types of malocclusion, some of which are preventable.

The necessity of extracting deciduous teeth when they are retained too long in order to prevent them from forcing the succedaneous teeth to erupt in malpositions has been suggested. Uncoordinated resorption of the roots of the deciduous teeth is the etiologic factor most commonly operating in this condition.

However, there may be ectopy of the permanent teeth that have no deciduous predecessors. The maxillary and mandibular first permanent molars sometimes are inclined to erupt ectopically. These teeth may assume an exaggerated mesial axial inclination in the crypt and as their eruptive movements advance them occlusalward, they impinge on the posterior surfaces of the distal roots of the second deciduous molars.

In such positions pressure on the roots of the deciduous teeth ultimately causes resorption. Unless this pressure is alleviated promptly, extensive destruction of root substance will ensue and premature extraction or exfoliation of the deciduous tooth must follow. Then the continued mesial shifting of the erupting first permanent molars will eventually place them in malpositions and malocclusion becomes an established fact.

In some cases it is possible to move the ectopically erupting permanent molar distally by the wedge force of a brass ligature separating wire applied between the contacts of the deciduous and permanent molars. This procedure, when effective, will prevent impaction of the permanent molar and root resorption of the deciduous molar.

Erupting first permanent molars are found in various degrees of ectopy. Some of the more extreme types require premature extraction of the second deciduous molar with subsequent orthodontic treatment.

### SEPARATING WIRES

There are occasions when malocclusion can be prevented by acquiring adequate space for the eruption and proper positioning of teeth. In the case of mandibular second bicuspids, insufficient mesiodistal width of the area between the mesial surfaces of first permanent molars and the distal surfaces of first bicuspids often creates a situation which causes either impaction or lingual eruption of the mandibular second bicuspids.

If only a small space is lacking, 23 gage brass ligature separating wires may be inserted at the mesial and distal contacts of the second bicuspids. By this procedure several millimeters of additional space can be acquired which may mean the difference between normal unobstructed eruption of the mandibular second bicuspids and their impaction.

With such a technic, malocclusion may be prevented.

### PROXIMAL SLICING OF DECIDUOUS TEETH

In the mixed dentition there are instances when additional space is needed for erupting permanent teeth. The required room may be made available by slicing

9. Massler, M., and Suher, T. The lingually locked maxillary incisor: a rapid technic for the construction of a plastic bite-plane. J. Den. Children 16:26, 1st. quart., 1949.

the proximal aspects of deciduous teeth in the immediate vicinity.

Indications for the application of this preventive therapy sometimes are found in the mandibular bicuspid area. In this segment of the arch, the erupting first bicuspid may not have sufficient mesiodistal space between the permanent cuspid and the second deciduous molar. The necessary room may be created by discriminate slicing of the mesial surface of the deciduous molar. This is permissible because the crown width of the second deciduous molar is in excess of that of its succedaneous tooth, the second bicuspid.

Slicing deciduous molars is advisable for a purpose other than that of making room for adjacently erupting permanent teeth. It may be useful in preventing abnormal cuspal interdigitation of permanent molars and bicuspids. Abnormal intercuspation of first permanent molars has a tendency to develop when the deciduous molars in one arch are lost prematurely and the permanent molar in that segment of the arch shifts mesially. If the maxillary first permanent molar drifts anteriorly, a false Class II or distoclusion may result; if the shift involves the mandibular molar, a false Class III or mesioclusion may develop.

In either case the incorrect locking of cusps of opposing posterior teeth can be prevented by trimming the distal surface of the maxillary second deciduous molar to prevent developing mesioclusions and of the mandibular second deciduous molar to prevent developing distoclusions.

## SUPERNUMERARY TEETH

Supernumerary or extra teeth frequently are found in the midline region of the maxillary denture. In this or any other region of the maxillary or mandibular denture, they are the cause of various types of dentofacial abnormalities. Their presence may be the cause of malocclusions characterized by impaction, midline diastemata, ectopic eruption or crowding of permanent teeth.

When supernumerary teeth are present in the maxillary incisor area, a typical anomaly ensues; that is, one or more of the permanent incisors usually are impacted. The common clinical picture is that the patient fails to exfoliate a deciduous central incisor at the expected time. The adjacent deciduous incisors are shed and their succedaneous teeth erupt on schedule. Roentgenographic exploration of the region superior to the retained deciduous incisor usually will disclose the presence of one or more supernumerary teeth. Treatment consists of prompt removal of the extra tooth or teeth. Their extraction generally is followed by uneventful eruption of the impacted permanent incisors.

In this condition early detection and elimination of the offending supernumerary tooth is the essential preventive orthodontic technic which the general practitioner should apply.

## PERNICIOUS HABITS

There are certain pernicious habits, the control and elimination of which should be considered in the province of the general practice of dentistry. There are two physiological functions; namely, sucking and swallowing actions, which are often perverted and this perversion causes dentofacial anomalies. The nature of the malocclusions produced by these habits is similar.

The existence of perverted thumb-sucking or finger-sucking is easily recognized because of the characteristic malocclusion which is produced. Usually the maxillary incisor teeth are displaced labially and the premaxillary process of the maxilla is forced anteriorly. Accompanying these changes there may be a lingual displacement of the mandibular incisors. In some instances the forward growth of the mandible may be restrained. The total effect is the develop-

ment of an anterior open bite.

Whenever a malocclusion with these characteristics is discovered in the routine examination of a child's occlusion, the existence of pernicious sucking or swallowing habits should be assumed until proved otherwise.

It is sometimes difficult to distinguish normal or harmless sucking habits from the pernicious forms. Sucking of any and all types is a natural and desirable activity in the infant.

According to Shaffer,[10] the infant will suck on any object that is brought into contact with the lips and this reflex behavior lasts for the first several months of postnatal life. For this reason thumbsucking or finger-sucking in infancy may be disregarded. When it is continued beyond the age of 2½ years and is practiced excessively, it becomes important because of the deforming action the habit may have on the denture.

However, at the age of 2 or 3 years, the possibility of a deformity of the dentofacial complex developing from the perverted sucking habit is of less significance than the fact that this type of sucking indicates the child is incompletely nourished, inadequately loved or insufficiently rested. Therefore, the habit usually can be controlled or eliminated by supplying more food, more affection or more rest.

The practice of rigidly following regularly scheduled feeding periods has largely given place to the policy of feeding the child whenever he is hungry and letting him eat as much as he wants. This practice has prevented many perverted sucking habits from developing.

Today many psychiatrists emphasize the importance of holding and fondling the baby often, especially at feeding time. The nursing bottle holder may be an accessory that gives the mother more time to perform her household duties, but its use is not conducive to the normal psychobiological development of the infant. The feeling of security is essential to normal emotional maturation of the child. Perverted sucking habits often develop in those children who have feelings of insecurity. There are instances of pernicious thumbsucking that have been satisfactorily managed by advising the parents to fondle and cuddle the baby more.

Most pernicious sucking habits are discontinued by the time the child is 2 years old. It is not a matter for concern if the preschool child occasionally sucks his thumb before going to sleep. If the act is not sporadic but is practiced continuously throughout the day, Massler and Wood[11] believe that it is a symptom of emotional maladjustment or rejection. In such cases the habit is symptomatic of some psychological difficulty which requires more elaborate treatment.

Infrequent thumbsucking or finger-sucking has no deleterious effect on the deciduous dentition. If the act is practiced often and with vigor, it may affect the positions of the deciduous anterior teeth and the form of the premaxillary process. Whenever the cause of the perverted sucking can be discovered and eliminated, the malformation of the deciduous dental arch is self-correcting. Lewis[12] observed that in all instances in which the thumbsucking habit was discontinued by the sixth year, the dental malformation corrected itself without appliances.

Orthodontists have many opportunities to see the damage wrought on the dentofacial complex by perverted sucking habits and this makes them anxious to encourage proper therapy at an early date in order to prevent the development of these malocclusions.

10. Shaffer, L. F. Psychology of adjustment. Cambridge, Mass., Houghton Mifflin Co., 1936, p. 32-40.

11. Massler, M., and Wood, A. W. S. Thumbsucking. J. Den. Children 16:1, 1st quart., 1949.

12. Lewis, S. J. Thumb-sucking: a cause of malocclusion in the deciduous teeth. J.A.D.A. 17:1060 (June) 1930.

## TREATMENT

The correction of pernicious oral habits often requires that the dentist and physician work closely together. They should consider those patients 2½ years of age and older who are continuous thumbsuckers worthy of examination and study. The physician may find the cause of the habit is insufficient nutrition or rest, an unfavorable social climate in the home, or what Hughes[13] terms "inadequate parentage." If the correction of these deficiencies does not result in discontinuance of the habit, the dentist should design and apply an appropriate appliance for correction.

The most effective appliance is an intraoral device specially fabricated for the individual patient. The appliance to correct thumbsucking is constructed in the form of a conventional lingual archwire with additions that cross the anterior portion of the hard palate. Wire crosshatchings cover the anterior palatal tissue. An appliance so designed prevents the patient from placing the palmar surface of the thumb in contact with this palatal tissue. When this prohibition is effective, the sucking act is less satisfying and the patient usually discontinues the habit. In the more stubborn case it may be necessary to solder barbs to the appliance in positions which will prick the thumb whenever it is placed in the sucking position.

## ABNORMAL SWALLOWING

Abnormal swallowing causes malocclusion less frequently than perverted sucking but is no less difficult to manage. The dentofacial anomalies that develop from this habit are similar, in many respects, to those produced by pernicious sucking.

In both instances an anterior open bite with protrusion of the maxillary incisors is a common characteristic.

The typical pattern of most abnormal swallowing acts is one in which the tongue is forcibly thrust between the teeth, and sometimes the lips, during the first stage of swallowing. The pressures exerted many times day and night against the teeth by this muscular organ, the tongue, account for the development of malocclusion.

Since most swallowing is a reflex action and is performed subconsciously it is difficult for the dentist to teach the patient the proper method of swallowing with passive swallowing exercises. Even the most cooperative and conscientious patient, though able to control most swallowing acts during his waking hours, will swallow many times in his sleep without this control. It is then that the well established perverted muscular habit pattern, which is now without conscious control, will undo all of the good of the exercise therapy.

For this reason the use of mechanical devices which restrain the tongue from forcing itself between or against the anterior teeth is essential adjunctive therapy to the swallowing exercises.

## SUMMARY

The general practitioner of dentistry is afforded many opportunities to practice preventive orthodontics. The application of prophylactic orthodontic technics, when indicated, will extend orthodontic service to a larger group of people. Extension of this service is necessary and desirable.

The general practitioner of dentistry can enter the realm of prophylactic orthodontic practice easily by:

1. Supervising the timely removal of deciduous teeth; that is, by extracting over-retained deciduous teeth and by intercepting the effects of their premature loss.

13. Hughes, B. O. Growth of children—psychological and hereditary factors. Am. J. Orthodont. 35:16 (Jan.) 1949.

2. Encouraging the punctual eruption of permanent teeth.

3. Fostering the normal intercuspation of deciduous and permanent teeth by inserting restorations of proper occlusal and proximal form.

4. Promoting the evolution of normal occlusion by intercepting or correcting conditions which preclude its development by: (1) correcting developing cross-bites; (2) intercepting ectopic eruption of permanent teeth; (3) preventing impaction of permanent teeth; (4) interfering with the establishment of abnormal occlusal relationships of first permanent molars; (5) finding and removing supernumerary teeth; (6) eliminating pernicious habits and (7) observing and counseling parents on the developmental phases of occlusion of the deciduous and permanent dentures.

# Pulp curettage

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Pulp curettage is a term applied to the removal of a portion of the pulp at the point of exposure. This method of treatment, similar to the vital pulpotomy, is recommended only for vital and healthy teeth.[1-4]

The reason for the initiation of the treatment, which permits more limited removal of pulp tissue than ordinarily is recommended for a pulpotomy, was to conserve tooth structure and operating time. Experience, since 1949, with the pulp curettage technic, warrants the conclusion that the percentage of success is equally as large as in the pulpotomy procedure. Accordingly it is believed that there is no advantage in removing the entire coronal portion of the pulp.

## TREATMENT PLAN

*Diagnosis: Selection of Cases for Treatment* • Having determined the need or desirability for the retention of the tooth by a review of the patient's roentgenograms and case history, the most favorable prognosis may be anticipated in those cases with an initial exposure.

A less favorable or poor prognosis is expected when (1) the patient is in poor health; (2) there is a large exposure of the pulp (greater than one millimeter in diameter) or a multiple exposure; (3) pus is found at the site of exposure and is followed by hemorrhage; (4) excessive hyperemia exists; (5) there is a dark

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1. Brauer, J. C., and others. Dentistry for children, ed. 2. Philadelphia, Blakiston Co., 1947, p. 324.

2. Easlick, K. A. Management of pulp exposure in the mixed dentition. J.A.D.A. 30:179 (Feb. 1) 1943.

3. Zander, H. A. Reaction of pulp to calcium hydroxide. J. D. Res. 18:373 (Aug.) 1939.

4. Zander, H. A., and Law, D. B. Pulp management in fractures of young permanent teeth. J.A.D.A. 29:737 (May) 1942.

viscous hemorrhage; (6) unprovoked pain is present, and (7) there is contamination during treatment.

Conditions which are a contraindication for treatment are: (1) periodontal involvement or (2) a putrescent pulp.

*Anesthesia and Isolation of Tooth* • Procaine anesthesia is used in operative procedures when an exposure of the pulp is anticipated. A rubber dam is recommended for the isolation of the tooth. When a rubber dam is not employed, a well fitted matrix is placed around the entire crown of the tooth as an aid to isolation, prior to removing the last bit of remaining caries.

*Operative Procedure* • Having the tooth anesthetized and properly isolated, the outline form of the cavity is prepared. The last procedure is to remove the remaining carious dentin, allowing the exposure to become clearly visible.

The entire crown, including the inside of the matrix, if used, is swabbed either with phenol, benzalkonium chloride or nitromersol. The cavity then is dried with sterile cotton pellets. Following this, a sterile round bur nos. 4 to 6 (depending on the size of exposure) is revolved against the exposed pulp, permitting it to penetrate slightly into the pulp chamber. The depth of the penetration will depend on the location. If the pulp horn is exposed, the horn is removed entirely. On an occlusal exposure, the bur is allowed to penetrate about two-thirds of its diameter into the pulp.

Hemorrhage will be noted in varying degrees, depending somewhat on the state of hyperemia. The blood should be removed from the cavity with sterile cotton pellets until the clot forms and the hemorrhage stops.

Calcium hydroxide is placed over the exposure in the following manner: a drop of sterile water is mixed with the powdered calcium hydroxide, and then the exposure is covered with a portion of this paste, and the surface of the paste is touched with a small pledget of cotton saturated with eugenol. The eugenol unites quickly with the calcium hydroxide and forms a crust on the surface of the paste, thereby preventing displacement of the paste. The water in the paste prevents the eugenol from penetrating beyond the surface.

After the excess eugenol is removed with a gentle stream of air, a base of zinc cement is inserted. The cavity then is ready for a metallic restoration.

## CASES TREATED

Since 1949, 377 posterior teeth have been treated with the technic described. The teeth were distributed as follows: 124 first deciduous molars, 222 second deciduous molars, and 31 first permanent molars.

It is interesting to note the power of recovery of the pulp in some of the cases with a poor prognosis. Figure 1, left, shows a lower right second deciduous molar one year after treatment. When treatment was initiated this tooth had a

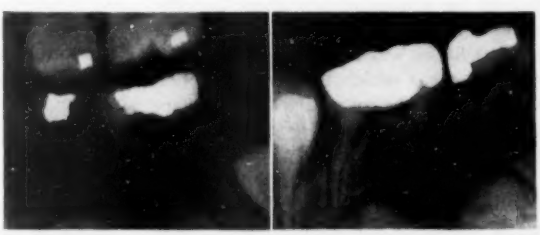

*Fig. 1 • Left: Lower right second deciduous molar one year after treatment. Right: Lower left second deciduous molar one year after treatment*

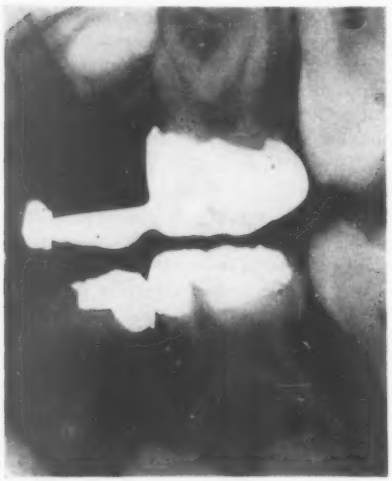

*Fig. 2 • Upper right second decidubus molar about nine months after treatment*

large exposure, the pulp was hyperemic, and the first evidence of blood from the pulpal area on exposure was extremely dark. The patient was administered 300,000 units of penicillin intramuscularly on two successive days, and a counter irritant also was used the first day.

Another interesting case is shown in Figure 1, right. In this instance the tooth on treatment presented two pulp exposures, and pus was evident in one exposure. After curetting with a bur, both exposures hemorrhaged freely. A calcium hydroxide application was made and a temporary cement filling was placed for approximately three months. After this period of observation, the cement filling was removed, and the two exposed areas which had been curetted were completely covered with secondary dentin. Accordingly, a base and a metallic restoration were inserted.

Figure 2 shows an upper right second deciduous molar nine months after treatment. The adjacent first deciduous molar was chronically abscessed and it was removed. The exposure in the second deciduous molar was large and the blood from the pulp appeared dark. A temporary cement filling was placed following the curettage treatment. Three weeks later the patient returned with the cement filling gone. The pulp tissue in that area had hypertrophied into the adjacent cavity. The tooth was anesthetized again and a second curettage was completed. An orthodontic band was used and cemented to place to assure retention of the temporary filling and to permit a period of observation. Seven months later the temporary cement filling was removed and a secondary dentin bridge was demonstrable. The tooth responded to the use of the pulp tester. Figure 2 shows the placement of a cantilever functional space maintainer, the successfully treated second deciduous molar being used as an abutment. To date, 71 cases have been under observation for one or more years following treatment. The distribution of these treated teeth is as follows: six first permanent molars, 29 first deciduous molars, and 36 second deciduous molars. On the basis of patient reaction and statements and roentgenographic check-up, the following results of the treatment have been recorded: 12 of the first deciduous molars and eight of the second deciduous molars have been recommended for extraction. These results and preliminary data indicate a potential of 72 per cent success in treatment. Further observation and a greater distribution of cases is warranted. Although a total of 377 posterior teeth have been treated to date, considerable difficulty has been encountered in recalling patients for check-ups because of the movement of Navy personnel in this area. Furthermore, this total number represents a considerable number of cases which have not been under observation for a year or more.

Another consideration in determining

the values and potentials for successful treatment is the selection of cases. The 377 teeth treated represent a wide distribution of pulpal involvement and only those with apparent periodontal involvement and with a putrescent pulp were eliminated as untreatable cases. Further refinements in diagnostic methods, and a further limitation of teeth selected for treatment, will no doubt result in a greater percentage of success.

## SUMMARY

1. Pulp curettage is a term applied to the removal of a portion of the pulp at the point of exposure.

2. This method of treatment is similar to the vital pulpotomy technic.

3. A total of 377 posterior teeth have been treated by the pulp curettage technic.

4. A preliminary report of 71 cases, which have been under observation for one or more years, indicates a potential of 72 per cent success with this method of treatment.

## CONCLUSIONS

The operative procedure of removing only a portion of the vital pulp at the site of the exposure is an acceptable technic in selected cases. Further refinements in diagnostic methods, prior to the initiation of treatment, is warranted to determine the real values of this procedure.

*Look and Learn* • We must look and learn, but we must never be too sure of ourselves. We must never pretend that we are omniscient. We must not let ourselves think that we really understand anything. We merely become familiar with certain kinds of events. Absolute certainty we shall never really possess. It is only a feeling with which some of us are occasionally afflicted. It is man's part to take pride in his achievements in the face of forces of nature, but it is even more his part to be humble in the face of existence as a whole. ***Francis Bitter, "The Potentialties of Physics," Transformation 1:126, 1952.***

COUNCIL ON DENTAL THERAPEUTICS

# Council reports on current status of penicillin dentifrices

Because additional evidence has become available since the publication of its preliminary report on penicillin dentifrices,[1] the Council on Dental Therapeutics has reviewed the present status of such dentifrices.

The preliminary report called attention in some detail to the investigation conducted at Walpole, Mass. This study[2] involved a regimented toothbrushing program and indicated a reduction in dental caries incidence of approximately 54 per cent in a group of 202 children who for two years had used a tooth powder containing 500 units of penicillin per gram. The Council's report also referred to an earlier unregimented investigation in which there was no demonstrable reduction in the incidence of dental caries from the use of a penicillin dentifrice.[3]

Recent reports issued by other investigators do not provide sufficient basis for unequivocal resolution of the problems relating to the usefulness or safety of a penicillin dentifrice as a prophylactic agent.

In a limited study, Walsh and Smart[4] reported no increased benefit from the incorporation of 100 units of calcium penicillin per gram into a calcium carbonate type of tooth powder which was used under supervision for periods of 12 to 19 months.

Hill, Sims and Newman[5] conducted a study in a manner similar to the Walpole experiment on 492 children for one year in South Euclid, Ohio, public schools. This was a regimented program in which a paste containing a procaine salt of penicillin was used. The results showed a reduction of approximately 10 per cent in the number of new carious teeth and 16 per cent reduction in the number of new carious surfaces for the experimental group.

Neither of these two reports provides confirmation of the substantial beneficial effects that were observed with the penicillin dentifrice in the Walpole investigation in 1950. Although reasons for the differences between the results of the earlier and the recent studies may become apparent as research continues in this sphere, it is the Council's opinion that the usefulness of penicillin dentifrices is even more doubtful at this time than it was when the preliminary report appeared.

The preliminary report of the Council called attention to some of the problems

1. Council on Dental Therapeutics, American Dental Association. Preliminary report on penicillin dentifrices. J.A.D.A. 40:619 (May) 1950.

2. Zander, H. A. Effects of a penicillin dentifrice on caries incidence in school children. J.A.D.A. 40:569 (May) 1950.

3. Hill, T. J., and Kniesner, A. H. Penicillin dentifrice and dental caries in children. J.D. Res. 27:744 (Dec.) 1948.

4. Walsh, J. P., and Smart, R. S. Clinical trial of a penicillin tooth powder. New Zealand D.J. 47:118 (July) 1951.

5. Hill, T. J.; Sims, John, and Newman, M. Reported at meeting of the International Association for Dental Research, Colorado Springs, Colo., March 21, 1952.

which require consideration in the proper evaluation of the safety of penicillin dentifrices. Of particular concern are (1) the possibility of sensitizing a significant portion of the population to penicillin and (2) the development of penicillin-resistant microorganisms in those using the dentifrice.

Previous reports indicated that sensitivity reactions are neither frequent nor severe.[2] Further studies of sensitivity, as judged by patch tests conducted in the South Euclid experiment,[5] did not show any development of these reactions in 450 children examined after they had used the penicillin dentifrice for one year or longer. However, it should be stated that the patch test is not considered an entirely accurate method of determining penicillin sensitivity. The question of penicillin-resistant organisms has been investigated since the Council report was issued. Two surveys were conducted at Walpole, Mass., one by Lind and Zander[6] and one by representatives of the Food and Drug Administration.[7] Another study was carried out as part of the South Euclid, Ohio, experiment.[8]

In the first of these studies,[6] 259 microorganisms were tested, of which 144 were isolated from the mouths of individuals who had been using penicillin dentifrice and 115 from subjects in the control group. The investigators found that the minimum concentrations of penicillin required for inhibition of the growth of bacteria from each group were comparable. They concluded that no acquired resistance to penicillin was demonstrated by the bacteria as an effect of using penicillin dentifrice.

This conclusion was not supported by the findings in the second[7] and third[8] reports. In each of the latter studies, the investigators tested a variety of several hundred microorganisms from the mouths of individuals in the control and experimental groups. It was shown that in the mouths of children using a penicillin dentifrice there was a higher percentage of organisms resistant to 0.5 units or more of penicillin than in the mouths of the users of the control dentifrice. While this finding was not consistent for each of the individual bacterial species that were studied, the frequency distribution pattern for *Streptococcus viridans* followed closely the over-all distribution pattern for all species taken together. In the South Euclid study it was also observed that the percentage of individuals with microorganisms resistant to 0.5 units or more of penicillin per cubic centimeter was greater in the experimental group than in the control group.

The significance of this apparent increase in the proportion of organisms showing resistance at higher levels of penicillin is not immediately clear. The *Ad Hoc* Committee on Penicillin Dentifrices of the National Research Council cautions that the possible clinical importance of this feature must be considered carefully.[9] The Council on Dental Therapeutics is in agreement with this opinion.

Because of the foregoing considerations; namely, (a) the contradictory nature of the evidence for the therapeutic usefulness of penicillin dentifrices when employed with or without supervision and (b) the tendency for development of a higher percentage of microorganisms resistant to 0.5 units or more of penicillin per cubic centimeter in the mouths of those using the penicillin dentifrice, the Council on Dental Therapeutics concludes that:

On the basis of available evidence, penicillin dentifrices should not be dis-

6. Lind, H. E., and Zander, H. A. Penicillin resistance of streptococci and staphylococci in a penicillin dentifrice study. J.D. Res. 30:112 (Feb.) 1951.

7. Welch, Henry, and others. The effect of prolonged use of penicillin tooth powder on the penicillin resistance of oral microorganisms. Antibiotics & Chemotherapy 2:250 (May) 1952.

8. Hill, T. J.; Rasch, Cleo, and Wellpert, Betty. The development of organisms with penicillin resistance associated with the use of a penicillin dentifrice. To be published.

9. National Research Council, Division of Medical Sciences. Report of the Ad Hoc Committee on Penicillin Dentifrice. Unpublished.

tributed at the present time except on a prescription basis.

Qualified individuals or institutions should continue to conduct further investigations concerning the therapeutic usefulness and safety of antibiotic dentifrices.

The Council on Dental Therapeutics reaffirms its classification of penicillin dentifrices in Group C.

# Current status of dental uses of fluorides

### I. FLUORIDATION OF MUNICIPAL WATER SUPPLIES

The Council on Dental Therapeutics has re-examined reports on the safety and efficacy of the fluoridation of public water supplies recommended by many health service agencies and has examined the claims made by those persons who oppose fluoridation. The Council reaffirms its position of recommending controlled fluoridation as a safe and effective dental health measure.

### II. TOPICAL USE OF FLUORIDE SOLUTIONS

The Council has given consideration to the suggestion that certain modifications in the suggested procedure for the topical application of sodium fluoride solution may be helpful in certain types of private dental practice. The Council believes, in view of the basic importance of the topical application of fluorides in reducing the incidence of dental caries in children, that it would be highly desirable to support additional work to provide adequate evidence of the effectiveness of applications on a different time schedule from the one ordinarily recommended.

### III. PROMOTION OF FLUORIDE PRODUCTS FOR USE AS DIETARY SUPPLEMENTS

Many products containing fluorides have been proposed for use as dietary supplements either as tablets to be ingested or for the fluoridation of an individual's drinking water in areas where the general water supply is free from fluorides. Proposals for the use of these items are based largely on the evidence which has been obtained in studies with fluoride-bearing municipal water supplies. There is very little published evidence available from direct clinical tests in human beings of the effect of solid dietary supplements of fluorides on dental caries.

One of the earlier publications[1] was considered by the Council in a previous report.[2] It was concluded that "certain factors, among them the comparatively small numbers of persons in the experimental groups which consisted of fifty-seven, thirty, sixty-eight and seventy-three subjects, respectively, wide age range of

1. Strean, L. P., and Beaudet, J. P. Inhibition of dental caries by ingestion of fluoride-vitamin tablets. New York State J. Med. 45:2183 (Oct. 15) 1945.

2. Council on Dental Therapeutics, American Dental Association. Council announces decision on synthetic fluoride tablets. J.A.D.A. 34:213 (Feb. 1) 1947.

subjects (8 to 16 years) and lack of adequate control in all phases of the study, render a positive conclusion impossible."

The plan for another fluoride study has been described. These publications were concerned largely or entirely with the possible effect of preparations containing calcium fluoride.

The Council has given consideration also to reports of balance studies in man, which indicate incomplete and variable absorption of fluoride from solid calcium fluoride and bone meal preparations.[3,4] A similar result has been observed in an animal study.[5] It therefore appears difficult or impossible to provide an accurately controlled dosage of "effective" fluoride for the patient through the administration of these slowly soluble fluoride compounds. It may be emphasized that these reservations apply only to calcium fluoride in the solid form and not to water solutions of this compound which can be prepared in relatively low concentrations.

For these reasons, the Council has reaffirmed its classification in Group D of tablets containing fluorides in the form of calcium fluoride or bone meal. Classification in Group D indicates that the products are unacceptable because of their demonstrated inability to meet the standards outlined in the provisions for acceptance.

The Council recognizes the potential usefulness of soluble fluoride tablets intended for the preparation of water for drinking and cooking purposes in areas where the benefits of a fluoridized communal water supply are not available. It should be emphasized, however, that the use of fluoride preparations should be under professional supervision (prescription use only). The following factors should be considered in the prescription of these preparations:

1. Fluoride supplements should be used or prescribed only for individuals living in areas where the drinking water is essentially free from fluoride.

2. Because of the possible hazards involved in the improper use of fluorides, prescription should be limited to those patients who may be expected to follow all directions carefully.

3. It should be recognized also that only a very conscientious individual can be expected to administer dietary supplements faithfully over the many years required to attain the maximum dental benefits of fluorides.

4. On the basis of present evidence, maximum benefits from dietary fluorides may be anticipated only when they are administered throughout the period of tooth formation or at least throughout the first eight years of life.

5. In order to obtain favorable results, the optimum amount of fluoride should be ingested daily.

All the available evidence, therefore, indicates that the fluoridation of municipal water supplies is the method of choice for providing the dental benefits of fluoride. The Council on Dental Therapeutics, however, does not wish to discourage further study of the use of fluoride tablets in areas where a municipal water supply is not available. The Council, therefore, has classified in Group C sodium fluoride tablets *which are dispensed by prescription* and which are intended for administration in drinking water. Group C consists of products for which the evidence is so limited that the products cannot be accurately evaluated. It is the Council's opinion that Group C products require further study by qualified investigators.

3. Machle, W., and Largent, E. J. The absorption and excretion of fluorides. II. The metabolism at high levels of intake. J. Indust. Hyg. & Toxicol. 25:112, 1943.

4. McClure, F. J., and others. Balances of fluorine ingested from various sources in food and water by five young men. Excretion of fluorine through the skin. J. Indust. Hyg. & Toxicol. 27:159, 1945.

5. Keyes, P. H., and Shourie, K. L. Dental caries in the Syrian hamster. V. The effect of three different fluoride compounds on caries activity. J.D. Res. (April) 1949.

## Status report on Kopal

The Council has received many inquiries regarding Kopal, promoted by the Frostie Winters Company and distributed by Technical Laboratories of New York.

The product is advertised as an agent "for covering up stains, blemishes, even gold fillings" and is intended to be applied directly over the teeth "like the enamel on your nails."

According to information supplied by Technical Laboratories several years ago (1941), Kopal contained the following substances: ethyl alcohol, gum sandarac, a copal resin, purified titanium dioxide and ethyl cellulose. According to information on the package label, Kopal Remover contains alcohol 90 per cent by volume.

In a letter addressed to the firm in 1950, information was requested concerning the current composition of the product and the evidence in support of its safety. No reply has been received.

The Council believes that the use of Kopal as a cosmetic agent might lull the user into a false sense of security and into a belief that needs for certain types of dental care, for example, replacement of defective restorations, are obviated by its use.

The Council has not evaluated the suitability or effectiveness of Kopal in achieving the results claimed in the advertising material because those claims appear to be for cosmetic use only. Furthermore, since the firm has not supplied a statement of composition, the Council is unable to confirm the firm's contention that the use of Kopal is a safe procedure.

## Council announces classification of additional products

The classification of products by the Council on Dental Therapeutics has been described in a previous report (*J.A.D.A.* 40:489, April, 1950). The Council's program now provides for classification of products in Group A, Group B, Group C and Group D. Products are reconsidered periodically and decisions are subject to change at any time that a substantial amount of new evidence becomes available. The files of the Council contain information on many drugs and dental cosmetics, and inquiries are welcome.

GROUP A

Listing of products in Group A means that at the time of their consideration, the items conformed with the provisions for acceptance established by the Council on Dental Therapeutics and adopted by the Board of Trustees and the House of Delegates of the American Dental Association. Items in this group will be listed in *Accepted Dental Remedies* and may use the Seal of Acceptance, unless otherwise provided.

The following additional products are classified in Group A:

*Penicillin G Procaine in Aqueous Suspension, 600,000 Units per cc.* (Abbott Laboratories): Each cc. of aqueous suspension is stated to contain penicillin G procaine, 600,000 units with suspending and dispersing agents. In 1 cc. syringe packages with a B-D Disposable Cartridge Syringe. U. S. Trademark: Abbocillin-DC. See *A.D.R.*, ed. 17, p. 65.

*Penicillin G Procaine, 600,000 Units, and Buffered Penicillin G Potassium, 200,000 Units, for Aqueous Injection* (Abbott Laboratories): Each single dose vial is stated to contain penicillin G procaine, 600,000 units, penicillin G potassium, 200,000 units with suspending and dispersing agents. In 1 and 5 dose vials. U. S. Trademark: Abbocillin 800M. See *A.D.R.*, ed. 17, p. 65.

*Eugenol* (Triboro Dental Supply Company): A brand of eugenol, U.S.P. See *A.D.R.*, ed. 17, p. 56.

GROUP B

**Listing of products in Group B means that there is insufficient evidence to justify their present acceptance, but there is reasonable evidence of their usefulness and safety. These products meet the other qualifications and standards established by the Council on Dental Therapeutics and the Division of Chemistry. It is the Council's opinion that Group B products may be promoted for special use and study.**

GROUP C

**Listing of products in Group C means that the evidence is so limited or inconclusive that the products cannot be accurately evaluated. It is the Council's opinion that Group C products require further study by qualified investigators.**

GROUP D

**Listing of products in Group D means that they are unacceptable because of their demonstrated inability to meet the standards outlined in the provisions for acceptance.**

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*Editorials*

## Fluoridated water and foods

The Food and Drug Administration of the Federal Security Agency on July 23 issued a statement of policy on fluoridated water, which strengthens the position taken by advocates of fluoridation and reassures processors of food in areas supplied by such water. Those who are opposed to fluoridation as a caries control measure have contended that the use of fluoridated water in the processing of foods may raise the fluorine content of canned goods to a harmful level.

Canners, rightfully concerned lest they be liable to prosecution if they used fluoridated water in their products, petitioned the Food and Drug Administration for a ruling. In complying, Mr. John L. Thurston, acting administrator of the Food and Drug Administration, made it clear that public water supplies do not ordinarily come under the provisions of the Federal Food, Drug and Cosmetic Act. Pointing out that the Federal Security Agency will regard public water supplies containing fluorine, within the limitations recommended by the Public Health Service, as not actionable under the Federal Food, Drug and Cosmetic Act, he stated: "Similarly, commercially prepared foods, within the jurisdiction of the Act, in which a fluoridated water supply has been used in the processing operation, will not be regarded as actionable under the Federal law because of the fluorine content of the water so used, unless the process involves a significant concentration of fluorine from the water. In the latter instance the facts with respect to the particular case will be controlling."

This ruling makes it clear that the Food and Drug Administration does not consider the small amount of fluorine in water recommended by the Public Health Service as in any wise harmful to health. And as to the use of such water in processing food, the Administration also implies, after considering such an eventuality, that no significant increase in the fluorine content of such processed food is anticipated.

# Delegates at St. Louis applaud scientific program, reject OASI and question military dental pattern

The ninety-third annual session of the Association held in St. Louis, September 8 to 11 was conducted with the same dispatch and smoothness which has become customary and expected during recent years. Of the many matters discussed and many actions taken, three appeared particularly noteworthy: a combined scientific section meeting, the House of Delegates action with respect to dentists' participation in OASI and an open discussion of the dental manpower needs of the military.

The scientific program was highlighted by a departure from the usual exclusively specialized meetings representing the various departments of dentistry. An innovation—or rather a return to an earlier tradition—was introduced in the form of two general programs for all scientific sections. Panel discussions were presented on two topics: an appraisal of the uses of antibiotics in dentistry and an evaluation of the effects of focal infection. These two themes, because of their somewhat controversial nature, attracted an overflow audience to Kiel Auditorium and gave opportunity for eight authorities in their respective fields to present in compact form the latest information on these subjects from different points of view. The interest manifest in these combined programs may indicate that program committees in recent years have adopted too exclusive and restricted an outlook on program building. It is to be hoped that one or more of these general programs, featuring some subject of outstanding interest to the profession, will be incorporated in future scientific sessions.

As was anticipated, one of the most critical matters to engage the House of Delegates in its deliberations was proposed participation of dentists in the old age and survivors insurance program of the National Social Security Act. A full day's airing of this subject in the reference committee, plus serious discussion on the floor of the House resulted in the rejection by the House of Delegates of both a tabled resolution of 1951 and a new resolution requesting the inclusion of dentists in OASI. This action, approved by an overwhelming majority of the delegates, indicates that the policy of the Association on this matter is now firmly established as opposing dentists' participation in OASI. A report of the House actions is published on page 481.

The third highlight of the session, less illuminating, unfortunately, than the other two, concerned a discussion of the dental manpower needs of the Department of Defense. A three-hour open meeting on this subject, reported on page 490 of this issue, participated in by ranking dental officials of the Army, Navy, Air Force, Selective Service, Office of Defense Mobilization and Department of Defense, left the audience confused and failed to clear up the many questions uppermost in the minds of many members. This confusion, it would seem, could have been prevented. This country has functioned on a military basis for ten long years. Certainly it is not too much to expect that out of that experience and in view of future prospects the country's patternmakers could fashion a workable plan which would enable dentists to fit, with slight confusion, into the master military pattern. If such a pattern has been devised it was not divulged in St. Louis.

# Better safe than sorry: no place for doubtful drugs in dental practice

The Food and Drug Administration of the Federal Security Agency issued a decision August 14, permitting the continued distribution of Chloromycetin (chloramphenicol) under revised labeling that cautions explicitly against its indiscriminate use. This caution is of importance to all dentists and especially to the growing number of those who are practicing endodontics.

A cloud of doubt has fallen on this widely acclaimed antibiotic. There are case records of blood disorders attributed to its use; and at the same time, it has been reported exceptionally effective in the treatment of infected dental root canals. The amount of Chloromycetin used in the treatment of an endodontic case is so small that it probably could not cause any serious systemic involvement; nevertheless, dentists will prefer to be aware of its dangerous potentialities.

Bender and Seltzer reported in the September 1952 issue of THE JOURNAL[1] that in 475 root canal cases treated with different drugs and different combinations of drugs, the most effective results were obtained with a combination of procaine penicillin G, streptomycin, chloramphenicol (Chloromycetin) and sodium caprylate. This combination, they state, yielded a negative culture in 97 per cent of 98 infected root canals after an average of 1.1 treatments.

Such a favorable report normally would stimulate other dentists to employ the Bender-Seltzer treatment in the hope of obtaining equally successful results. Until all doubts regarding the deleterious systemic effects of chloramphenicol are dispelled, however, most dentists will be slow to adopt this drug.

Reports of blood disorders attributed to chloramphenicol led the Food and Drug Administration last June to make a nationwide survey of case records in hospitals and clinics. Four hundred and ten of these case records were evaluated by a special committee of the National Research Council. Of these, 177 were definitely known to be associated with the use of Chloromycetin. In 61 cases Chloromycetin was the only drug used. In the remaining 116 cases other drugs had also been given. In both groups fatalities totaled 50 per cent as a result of aplastic anemia and related conditions in which the bone marrow has lost its ability to manufacture both red and white cells of the blood.

Although this situation is regrettable, the number of patients involved, less than 500, is extremely small, as the Food and Drug Administration points out, in comparison to the estimated 8,000,000 persons who have been given the drug since it came on the market in 1949. Despite that low ratio, however, and despite the wonderful potentialities of this antibiotic drug in the field of medicine, every precaution must be taken to prevent future fatalities from its use. As Irvin Kerlan, M.D., acting medical director of the Food and Drug Administration warns, the recent experience with Chloromycetin "is an impressive reminder that highly potent drugs must be treated with extreme care and should not be employed unless there is a clear-cut indication that they are needed." Until it has been demonstrated definitely that the use of chloramphenicol in the treatment of dental disorders has no deleterious systemic effect most dentists wisely will use other drugs in the treatment of their patients.

1. Bender, I. B. and Seltzer, Samuel. Combination of antibiotics and fungicides used in treatment of the infected pulpless tooth. J.A.D.A. 45:293 (Sept.) 1952.

# *Washington News Letter*

Washington is watching with interest the great attention given to national health issues by Presidential and Congressional candidates, in the course of their campaigning.

It would be premature to assume that this prominence portends the passage of any major legislation dealing directly with health care. Nevertheless, signs point definitely to early consideration by the new Congress of questions relating to the country's medical and dental manpower.

The problem of dental manpower has two specific aspects: (1) The fulfillment of military requirements must be assured, and (2) Congress must decide whether to authorize and appropriate government funds to increase the supply of physicians and dentists through scholarships and school subsidies.

As for the first point, the Department of Defense will probably press for the retention of the present draft law, Public Law 779, but will suggest amendments. Many of the law's inequities were discussed in the military symposium held at St. Louis in connection with the American Dental Association's annual meeting.

### SCHOLARSHIPS AND SUBSIDIES

Regarding federal financial aid, a significant step was taken in September when the Armed Forces Medical Policy Council gave formal approval to a plan for establishing military scholarships in schools of medicine, dentistry, nursing and veterinary medicine. The plan also provides for federal payments to the schools to cover the full costs of training scholarship holders.

The objective of the Department of Defense, which the Council serves in an advisory capacity, is to strengthen the Regular Corps in the medical departments of the Army, Navy and Air Force. This would be accomplished by requiring scholars to serve in uniform, following graduation, for periods equal in length to their scholarships.

While the Pentagon's goal is not *per se* to increase the country's inventory of doctors and nurses, it is inevitable that Congress will consider the program in its relation to other bills aimed in that direction.

Present draft of the scholarship plan, as approved last month by the Council, makes the following provisions, among others:

Participation of dental schools would be entirely voluntary. Those taking part would receive not the ordinary tuition fee but the full cost of training each scholarship appointee.

The dean would nominate a maximum of six students from each class for each of the armed services—Army, Navy and Air Force. These nominations would be made *after*, not before, the student had been accepted for enrollment in the school. From these selected candidates the military departments would make their choices.

Each appointee would receive a monthly stipend of $133, over and above the tuition, laboratory and other expenses defrayed by the government. He could withdraw from the program at any time, provided he paid back to the Treasury the full amount that had been expended in his behalf. This "escape clause" also would apply during his obligated military duty, following graduation.

The Armed Forces Medical Policy Council —whose dental member is James P. Hollers of San Antonio, Texas—recommends that the plan be set up on a scale sufficient to produce 126 dental graduates each year for entrance into the Dental Corps, to be divided as follows: Army, 52; Navy, 42, and Air Force, 32.

### BUREAU OF INTERNAL REVENUE

The Bureau of Internal Revenue recently published two rulings of importance and interest to the health professions. One deals with deductibility, for income tax purposes, of sums which a physician may pay to another practitioner on a "professional assistance" basis or on a fee-splitting basis. The other ruling concerns social security payments by non-dental members of partnerships engaged in practice of dentistry.

Money paid by physicians to other physicians may be deducted as business expenses provided such payments, said the Bureau, "are normal, usual and customary in the profession and in the community; are appropriate and helpful in obtaining business; and do not frustrate sharply defined national or state policies evidenced by a governmental declaration proscribing particular types of conduct."

The partnership ruling came about as a result of inquiries received as to whether a non-dentist associated with dentists in a partnership status, shall make his Federal social security payments entirely out of his own pocket or bear only one-half of the premium cost. The Bureau ruled that his dis-

tributive share from the partnership does not constitute self-employment income; therefore he is obliged to pay only one-half the cost and the other half must come out of the partnership's payroll.

### SALUTE TO DENTAL CORPS

Returning to Washington in mid-September from a 40-day trip to Korea, Japan and Europe, Rear Adm. H. Lamont Pugh, Surgeon General of the Navy, told a Pentagon press conference that he was highly pleased by what he had see of dental officers and corpsmen in action on the fighting fronts.

"At one spot in Korea, right up front within sound of gunfire, there was a mobile dental unit attached to a Marine outfit," said Admiral Pugh. "That little unit and its personnel were busy as beavers, with all the equipment needed to do anything from fill a tooth to fashion a complete set of dentures."

### VETERANS ADMINISTRATION

The probability is increasing that Congress will be asked to appropriate additional funds for the Veterans Administration, to restore services that have been virtually crippled by budgetary retrenchment. Meeting in Washington on September 10, the medical advisory board of the American Legion deprecated the across-the-board cutback which has had to be instituted, including a sharp reduction in VA's so-called home town dental care program and a restriction in the use of consultants in veterans hospitals.

"Definite harm has come to the quality of service," said Leonard G. Rowntree of Miami, chairman of the board.

## NINETY-THIRD ANNUAL SESSION REJECTS OASI COVERAGE; ELECTS OFFICERS, PRESENTS SCIENTIFIC PANELS

A resolution calling for the inclusion of dentists under federal Old Age and Survivors Insurance provisions was overwhelmingly rejected by delegates representing the 54 constituent societies and 76,000 members of the American Dental Association, at the Association's 93rd annual session September 8-11 in St. Louis.

In other business, the House of Delegates voted to oppose the extension of Public Law 779 beyond its expiration date of July 1953, only if an improved program for the procurement of dental manpower were proposed.

A special committee was established to study growing problems of medical-dental relations in the field of oral surgery and hospital dental practice; the committee was requested to make recommendations for the solution of these problems. Members of the committee are to represent the Association, the American Board of Oral Surgery, American Society of Oral Surgeons, American Association of Dental Schools, American Association of Dental Examiners, Council on Dental Education, Council on Hospital Dental Service, Advisory Committee on Dental Specialties, a regional oral surgery society and general practitioners.

### ASSOCIATION OFFICERS

Otto W. Brandhorst of St. Louis, dean of Washington University School of Dentistry, was installed as president of the Association at the close of the meeting, to succeed LeRoy M. Ennis of Philadelphia.

Leslie M. FitzGerald, oral surgeon of Dubuque, Iowa, was named president-elect. The vice-presidents of the Association, chosen by acclamation of the House, are Henry F. Westhoff of St. Louis, who was chairman of the local arrangements committee for the 93rd annual session, first vice-president; Fritz A. Pierson of Lincoln, Neb., second vice-president, and John A. O'Keefe of Washington, D.C., third vice-president.

Harry Lyons of Richmond, Va., who presided as speaker of the House during the 93rd annual session, was elected speaker for next year.

Harold Hillenbrand of Chicago was reappointed secretary of the Association for a term of three years, and H. B. Washburn of St. Paul was reappointed treasurer for a one-year term. As Lon W. Morrey of Chicago was reappointed editor of the Association in 1950 for a term of three years, these were the only officers of the Association to be appointed this year.

### ELECTION OF TRUSTEES

As the terms of Trustees from the First, Sixth, Seventh and Tenth Districts expired this year, the following were elected to the Association's Board of Trustees: A. F. Schopper of Kansas City, Mo., succeeding Robert P. Thomas of Louisville, Ky., Sixth District; Earl G. Jones of Columbus, Ohio, succeeding J. B. Carr of Indianapolis, Seventh District, and Lewis W. Thom of Minneapolis, succeeding C. S. Foster of Cedar Rapids, Iowa, Tenth District. Charles I. Taggart of Burlington, Vt., was re-elected Trustee for the First District.

Leslie M. FitzGerald
president-elect

Otto W. Brandhorst, president

Fritz A. Pierson
2nd vice-president

Henry F. Westhoff
1st vice-president

**NEWLY APPOINTED OFFICERS AND TRUSTEES**

John A. O'Keefe
3rd vice-president

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These officers and trustees were also chosen at the 93rd annual session:

1. Harold Hillenbrand, secretary
2. Harry Lyons, speaker of the House
3. H. B. Washburn, treasurer
4. Charles I. Taggart, trustee, First District
5. A. F. Schopper, trustee, Sixth District
6. Earl G. Jones, trustee, Seventh District
7. Lewis W. Thom, trustee, Tenth District

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### HONORARY AND ASSOCIATE MEMBERS

W. T. Sanger, president of the Medical College of Virginia, was elected to honorary membership in the American Dental Association by acclamation of the House of Delegates. Dr. Sanger, president of the College since 1925, has been an honorary member of the Virginia State Dental Association for several years. He is a former president of the Virginia Hospital Association and is a member of the board of Meharry Medical College and of the National Society for Crippled Children and Adults.

In its recommendation, the Board of Trustees advised the House: "President Sanger has a very distinguished record in the field of general education and his years as president of his institution have been marked by an earnest devotion to the problems of dentistry and of dental education."

Three members of the Association's Central Office staff were elected to associate membership by the House. They are: George B. Denton, research consultant to the Bureau of Library and Indexing Service; J. Roy Doty, secretary of the Council on Dental Therapeutics, and Sholom Pearlman, assistant secretary of the Council on Dental Therapeutics.

### LIFE MEMBERSHIPS

A total of 384 dentists from 45 states and the District of Columbia were elected to life membership in accordance with Association bylaws which require a life member to be 65 and an active member of the Association for 35 years.

The following constituent societies are represented: Alabama, 1; Arkansas, 1; Army, 1; California, 8; Southern California, 8; Colorado, 4; Connecticut, 7; Delaware, 1; District of Columbia, 2; Florida, 2; Georgia, 4; Idaho, 1; Illinois, 16; Indiana, 15; Iowa, 5; Kansas, 3; Kentucky, 7; Maine, 6; Maryland, 5; Massachusetts, 46; Michigan, 3; Minnesota, 22; Mississippi, 3; Missouri, 18.

Also, Montana, 5; Navy, 1; Nebraska, 5; New Jersey, 21; New Mexico, 1; New York, 28; North Carolina, 6; North Dakota, 4; Ohio, 17; Oklahoma, 3; Oregon, 8; Pennsylvania, 19; Rhode Island, 2; South Carolina, 6; South Dakota, 4; Tennessee, 1; Texas, 44; Utah, 1; Veterans, 1; Virginia, 6; Washington, 7, and Wisconsin, 5.

## SCIENTIFIC SESSION

Approximately 1,500 persons attended the combined meeting of all scientific sections September 10 in the Opera House of Kiel Auditorium, and heard panel discussions on "Antibiotics in Dentistry" and "Oral Focal Infection."

Antibiotics are of great use in dentistry, the first panel agreed, but caution should be exercised in their administration. The consensus was that since there is no assurance that chemists can continue to develop new antibiotics, dentists must avoid the overuse of present antibiotics, in order that patients might continue to receive the optimum benefit from these antibiotics.

Participants in the panel on antibiotics were Robert J. Glaser, physician of St. Louis; Col. Jack B. Caldwell, DC, USA, of Washington, D.C., and Floyd D. Ostrander of Ann Arbor, Mich. Harry Lyons of Richmond, Va., was moderator.

Oral focal infection should not be assumed in illness such as arthritis, and healthy teeth should not be removed in an effort to rid patients of unrelated diseases, it was concluded by the panel on oral focal infection.

In dealing with victims of heart disease, however, dentists should recognize the possibility of subacute endocarditis, according to the panel, and should em-

ploy procaine penicillin or similar premedication before dental operations.

Members of the panel were Kenneth A. Easlick of Ann Arbor, Mich.; William E. Wellman, physician of Rochester, Minn., and James R. Cameron of Philadelphia. Lester W. Burket of Philadelphia presided.

In other scientific sessions, 11 sections presented 60 essayists. A total of 200 table clinics were also presented, as well as a full program of television clinics and scientific films.

### EXHIBIT AWARDS

The Council on Scientific Session awarded prizes to the best scientific exhibits in each of three classifications; exhibits were classified according to whether they were presented by an association, individual or federal agency. The award winners were:

*Associations* • St. Louis University School of Dentistry, first; Washington University School of Dentistry (St. Louis), second; American Dental Hygienists' Association, third.

*Individuals* • Frank J. Gruchalla of St. Louis, "Conservation of the Tooth and the Contiguous Tissues," first; Jesse V. Boswell of Springfield, Mo., "Balancing Complete Dentures for Masticatory Function," second; Louis H. Jorstad of St. Louis, "Benign and Malignant Lesions of the Mouth," third.

*Federal* • United States Air Force, exhibiting a mobile dental trailer, first; National Bureau of Standards, Veterans Administration, American Dental Association and Armed Forces, "Cooperative Dental Research at the National Bureau of Standards," second; Walter Reed Army Medical Center, third.

## ACTIONS OF THE HOUSE OF DELEGATES

The heavy business agenda of the 93rd annual session required a special additional meeting of the House of Delegates, which was called on the morning of September 11 by Harry Lyons, speaker of the House.

Decisions on policy for the Association were made by 373 delegates who attended the five meetings as representatives of 54 constituent societies.

After an opening session during which they heard international guest speakers and the report of Retiring President LeRoy M. Ennis, the delegates turned to the business of Council reports, resolutions from state dental societies, the report of the Board of Trustees and unfinished business. The actions taken by the 1952 House of Delegates on matters of import to the dental professional and the public which it serves, are reported as follows.

### DENTAL-MEDICAL RELATIONS

Problems relating to oral surgery, hospital dental service and inter-professional relations are to be studied during the coming year by a special committee established by the House of Delegates.

A report of the Board of Trustees, noting "an apparently increasing tendency of other professions to direct criticism at dentistry's relations with hospitals and at the practice of oral surgery by dentists," precipitated the House action.

The report cited recent instances in which medical practitioners have objected to the practice of oral surgery as "an invasion of the field of otolaryngology and of medical practice in general."

In accordance with the House resolution, the special committee's chairman will be the Association President; members will include a dental practitioner,

and representatives of the American Board of Oral Surgery, American Society of Oral Surgeons, American Association of Dental Schools, American Association of Dental Examiners, Council on Dental Education, Council on Hospital Dental Service, Advisory Committee on Dental Specialties and a regional oral surgery society.

In view of the proposed study, the House postponed the consideration of standards for the Association's approval of hospital dental service and of hospital dental internships and residencies.

### REJECTION OF OASI

Two resolutions which would have approved the inclusion of dentists under the provisions of Old Age and Survivors Insurance, were rejected after discussion on the floor of the House for the second consecutive year.

Last year, the House tabled the Massachusetts Dental Society's resolution to reverse the stand taken by the Association in 1949, in opposition to OASI for dentists.

This year, the delegates considered and rejected that resolution and an additional one submitted this year by the Society. Massachusetts was the only state whose delegation went on record as voting in a body to favor the resolution.

### PUBLIC LAW 779

The support or opposition of the Association to the continuance of Public Law 779 after its expiration date of July 1, 1953, will hinge on the acceptability of a substitute program which may be offered.

The wording of the House resolution regarding the physicians-dentists draft act is as follows:

*Resolved*, that the Council on Legislation be instructed to oppose the continuance of Public Law 779 after its present expiration date of July 1, 1953 only if a substitute program which seems to be practicable has been proposed to the American Dental Association.

### AID TO STATES IN VA MATTERS

The Association's appropriate agencies were instructed "to give assistance" to constituent societies which request aid in state-level dealings with the Veterans Administration. The House passed the resolution on this matter after an appeal from the Oregon State Dental Association, whose delegates asked for help in reorganizing its Veterans Administration dental program.

### PUBLIC HEALTH

The following standards for the development of dental health programs in industry were approved:

1. The program in all of its policies and regulations should be developed to assure the highest quality of dental care for the industrial patient.
2. The industrial patient (employee) should have the right to select the private practitioner of his choice.
3. The program should be developed in full consultation with the dental profession through the medium of state and local dental advisory committees.
4. All dental treatment services should be rendered by a licensed dental practitioner.
5. The industrial program should consist of:

(a) preplacement and periodic examination including roentgenograms of all employees,
(b) emergency services including treatment of injuries and diseases of an occupational nature.
(c) keeping of accurate dental records,
(d) education in dental health,
(e) referral of employee to private practitioner.

6. The dental program should be clearly integrated with the other health services constituting the industrial program, and the professional phases of the dental program should be administered by a licensed dental practitioner.

*Indian Affairs* • The Association recorded its approval of legislation which would transfer the health activities of the Bureau of Indian Affairs, Department of

the Interior, to the U. S. Public Health Service.

*Other Statements* • The statements "Dental Public Health Objectives and Activities," and "Grant-in-Aid Funds," proposed by the Council on Dental Health, were also adopted.

### 1955 ANNUAL SESSION

San Francisco was chosen unanimously by the House of Delegates to be the site for the 1955 annual session of the Association; the Board of Trustees later chose October 17-20 as the dates of the 1955 session.

The limitation on planning the annual session only three years in advance was removed when the House resolved that the site for the annual session be selected "at least one year in advance," but named no maximum limit.

### HEALTH INSURANCE

The Council on Insurance was instructed to negotiate, if possible, a rider to the health and accident insurance policy that shall provide coverage for "all sicknesses and all accidental bodily injuries except pregnancy, childbirth and miscarriage, suicide and injuries due to hazards of warfare."

The House refused to postpone the effective date of the policy, however, as requested in a resolution objecting to the fact that private flying is not insurable under the present policy.

### VA OUTPATIENT PROGRAM

The Council on Legislation was directed to study the statutes and regulations governing the Veterans Administration outpatient dental care program, and the "proper agencies" of the Association were instructed to use the study "to produce a sound and realistic dental program beneficial to the worthy veteran."

The House resolution incorporating these directives terms the existing program "unrealistic" and a departure "from the original concept of governmental responsibility for the treatment of service-connected disease."

The House rejected two other resolutions regarding the VA dental programs. The Indiana State Dental Association's resolution would have limited the veteran's benefit to complete treatment during one year following his release from service. The Oregon State Dental Association would have limited dental benefits to those disabled in the service of their country.

### DEADLINES, WAIVER OF DUES

Hereafter, the number of delegates allowed each constituent society will be determined by the number of fully privileged members appearing on the society's roster on the December 31 preceding the annual session.

The House approved the earlier deadline for determining a society's number of delegates to ease administrative actions in the Central Office and the constituent society offices.

The deadline for retaining active membership in the Association was set at March 31, with the following resolution: "An active member whose dues for the current year have not been paid by March 31 of that year, shall cease to be a member of the Association."

The cut-off date will apply to membership in the Association's insurance policy, it was announced by the Council on Insurance. Non-members of the Association will not be eligible to participate.

The House refused to waive dues for Association members on temporary duty with the Armed Forces; however, totally disabled veterans who are members of the Association and who have already had their dues remitted, were made eligible to participate in the Association's insurance plans.

### JOURNALISM STANDARDS

"The objective of the dental publication is to elevate the profession by keeping the members of the society informed of the scientific, social and economic developments which affect the health and welfare of the public," states the *Standards for Constituent Dental Society Publications,* which was adopted by the House of Delegates.

The document, drafted by the Council on Journalism in accordance with a resolution of the 1950 House of Delegates, sets forth standards on objectives, support, administration and publication technics of constituent society journals.

"Every constituent dental society should own and control its own publication," according to the *Standards.* When possible, the publication should contain research and practical articles, case reports, abstracts of current literature, book reviews, editorials, news of the profession, reports of the society's official actions and a roster of officers.

"Each constituent dental society should establish a written policy relative to the type of advertisements which may appear in its publication," states the section on support of publications.

### BUDGET FOR 1953

From an income estimated at $1,791,705 for 1953, the Association has been authorized to expend $1,622,279, providing an anticipated excess of $169,426 in income over expenses.

During consideration of the budget, the House of Delegates voted to support the aptitude testing program of the Council on Dental Education on the same basis as the preceding year. The delegates disapproved a recommendation that the fee for each applicant be raised to $15, from the present fee of $10, to defray the expenses of the program.

In general, the 1953 budget shows an increase of $99,361 in income and an increase of $133,854 in expense over the 1952 budget.

Major sources of income during 1953 will be membership dues, advertising revenue from the Association publications, exhibit rentals and fees charged for the Council on Dental Education aptitude tests.

Major expenses will be general administration, the services of the bureaus and departments, Council expenditures and publication costs.

### CIVIL DEFENSE

The appointment of dentists on the civil defense health services committees of each state and territory, was urged by the House of Delegates. The House also approved the policy of seeking the appointment of a dentist to be "director of dental activities" for each regional office of the Federal Civil Defense Administration.

The subcommittee on civil defense was continued for one year and was reconstituted as a subcommittee of the Council on Federal Dental Services.

### DENTAL EDUCATION

The House recorded its disapproval "of any move to have the accreditation of dental schools and schools in related fields of dental education become the responsibility of any group that is not an agency of the dental profession."

Dental schools were urged to provide courses which will equip dentists to serve as instructors in civil defense programs, and to provide training which will equip foreign students to become dental instructors in their own countries.

The number of applicants for the National Board examinations has increased from 333 in December 1949 to 1,421 in April 1952, it was announced to the House by the Council of the National Board of Dental Examiners. As of July 1, 1952, a total of 28 states were accept-

ing the scores of the National Board examinations.

### LIST OF DENTAL SPECIALISTS

A move to restrict the listing of specialists in the *American Dental Directory* was tabled by the House of Delegates. The *Directory* will continue to list as specialists (1) diplomates of a recognized specialty board; (2) dentists who are licensed as specialists by the states in which they practice; (3) members of a recognized specialty society.

The tabled resolution would have restricted the list of specialists in the *Directory* to the first two categories.

### RESOLUTION OF MOURNING

At its opening session, the House of Delegates noted "with deep regret" the death of Ernest G. Sloman, who had been elected speaker of the House at the last annual session. A resolution was passed citing Dr. Sloman as "a most distinguished and illustrious member of the dental profession," and recording the delegates' "profound sorrow in the loss of their respected confrere."

### APPOINTMENTS TO COUNCILS

New Council members were appointed by the House of Delegates to full three-year terms, or to terms of one or two years, to fill Council vacancies.

*Constitution and Bylaws:* J. P. O'Farrell of Houston, to 1955.

*Council on Dental Education:* Eugene R. Westcott of Atlantic City, N. J., to 1955; Bert L. Hooper of Lincoln, Neb., 1953, nominated by the American Association of Dental Schools; Arthur Easton of Norway, Maine, 1955, nominated by the American Association of Dental Examiners; R. W. McNulty of Glendale, Calif., nominated by the American Association of Dental Schools.

*Council on Dental Health:* David W. Brock of St. Louis, to 1955; Charles P. Crowe of East Orange, N. J., 1955; Donald H. Miller of Elmira, N. Y., 1955.

*Council on Dental Museum and Registry:* Grant Van Huysen of Indianapolis, 1955.

*Council on Dental Research:* Maynard K. Hine of Indianapolis, 1955; L. E. Van Kirk of Pittsburgh, 1953.

*Council on Dental Therapeutics:* Clarke E. Chamberlain of Peoria, 1953; George E. Clendenin of Bethesda, Md., 1954; Philip Jay of Ann Arbor, Mich., 1955; Paul C. Kitchin of Columbus, Ohio, 1955 and Floyd L. Paynter of Omaha, Neb., 1955.

*Council on Dental Trade and Laboratory Relations:* Walter E. Dundon of Chicago, 1955.

*Council on Federal Dental Services:* Rudolph H. Friedrich of Plainfield, N. J., 1955.

*Council on Hospital Dental Service:* H. Cline Fixott, Jr., of Portland, Ore., 1955.

*Council on Insurance:* Ned A. Arganbright of Freeport, Ill., 1953; J. S. Eilar of Albuquerque, N. Mex., 1955.

*Council on International Relations:* H. M. Flickinger of Siloam Springs, Ark., 1955.

*Council on Journalism:* J. C. A. Harding of San Diego, Calif., 1955.

*Judicial Council:* George M. Anderson of Baltimore, Md., 1953; Willard C. Fleming of Oakland, Calif., 1954; Charles C. Poindexter of Greensboro, N. C., 1955.

*Council on Legislation:* J. C. Earnest of Monroe, La., 1955.

*Council on Membership:* H. C. Jarvis of Cincinnati, 1955.

*Council of National Board of Dental Examiners:* C. E. Matteson of Tucson, Ariz., 1955; Victor L. Steffel of Columbus, Ohio, 1955, nominated by the American Association of Dental Schools, and T. M. Birkbeck of Milton, Ore., 1955, nominated by the American Association of Dental Examiners.

*Council on Relief:* M. C. Hansen of Racine, Wis., 1955.

*Council on Scientific Session:* R. W. Frost of Kansas City, Mo., 1955.

The Board of Trustees appointed five new Council chairmen, as follows:

*Council on Dental Education:* Bert L. Hooper of Lincoln, Neb., chairman, to succeed Eugene R. Westcott of Atlantic City, N. J.

*Council on International Relations:* Paul H. Jeserich of Ann Arbor, Mich., chairman, to succeed Don J. Aubertine of San Francisco.

*Council on Journalism:* William L. Barnum of Portland, Ore., chairman, to succeed Charles A. Wilkie of Brooklyn.

*Council on Membership:* John R. Wallace of Winchester, Mass., to succeed H. C. Jarvis of Cincinnati.

*Council of National Board of Dental Examiners:* Gordon L. Teall of Hiawatha, Kan., succeeding Robert J. Wells of Chicago.

OTHER ACTIONS

The House refused to incorporate the Council on Hospital Dental Service in the Council on Dental Education. The resolution suggesting a "Council on Dental Education and Hospital Dental Service," was tabled.

The consecutive tenure of Council members was limited by the House. Council members can no longer serve more than two consecutive terms of three years each, according to the resolution passed September 11.

The pension trust agreement with Association employees was amended to provide that participants in this plan shall contribute one-third instead of one-half of the cost of their future service benefits.

After reaffirming the Association's stand that the administration of dental corps of the federal services should be directed by dental officers, the House requested the Secretary of Defense to study methods by which the operation of the dental service of all military departments could be made equal to other health services.

A resolution which would have urged the Armed Forces to recall to active duty all able retired dental officers of the regular services was rejected by the House.

The House endorsed the 1952 Crusade for Freedom campaign and called upon Association members to volunteer their services to local Crusade committees on behalf of Radio Free Europe and other activities of the organization.

## REPORT OF THE PRESIDENT

Greater participation in the activities of state and local dental societies will benefit both the public and the dental profession, declared retiring president LeRoy M. Ennis in his address September 8 to the opening session of the House of Delegates.

"There are some things which the American Dental Association should not do for its constituent societies and which the constituent societies can best do for themselves. The best way to prevent an undesirable amount of centralization—in government and in dental organization—is to have effective and productive programs at the state and local levels," Dr. Ennis emphasized.

*Dentists-Physicians Draft* • The president's report also criticized the military services for the lack of "a rational and realistic program for the orderly recruitment of health professional personnel."

Although expressing the wish of the Association to cooperate with the armed services, Dr. Ennis concluded, "The Association will use all of its resources to aid in providing military personnel with the benefits of dental care, but it can not do so effectively if the military is unable or unwilling to do better than improvise a day to day program as events develop."

*Fluoridation* • Between 25 and 30 million persons will be drinking fluoridated water by the end of this year, Dr. Ennis stated.

Reviewing the progress of fluoridation during the two years since the Associa-

tion recommended the anti-caries measure, he remarked:

"I am pleased to report that by mid-July of this year, a total of some seven million persons residing in 356 communities in the United States were routinely drinking fluoridated water. Additionally fluoridation has been approved by local governing bodies in some 300 other communities with a total population of more than 17 million persons."

*Other Matters* • Dr. Ennis also commended Association members for their generous contributions to the Relief Fund, observing, "I know of no other profession which has a record quite as proud as this." He urged American dentists to participate in international dental meetings and also urged an aggressive campaign to discourage further delay in the construction of the proposed National Institute of Dental Research building.

In conclusion Dr. Ennis thanked the officers, Trustees and members who cooperated with him during his administration.

In accepting this report, the House of Delegates unanimously commended Dr. Ennis for his outstanding service to American dentistry, for a very fine report and for his personal and sincere efforts on behalf of the Association.

## REPORT OF THE BOARD OF TRUSTEES

In its report to the House of Delegates September 8, the Board of Trustees announced the following administrative actions taken during the preceding year:

### APPOINTMENTS

At the Board Meeting in March, Frederick A. Henny of Detroit was appointed to a three-year term as editor of the *Journal of Oral Surgery*, replacing Reed O. Dingman of Ann Arbor, who resigned.

Harry Lyons of Richmond, Va., was appointed Speaker of the House of Delegates, as an *ad interim* officer, replacing the late Ernest G. Sloman, who had been designated as Speaker of the House of Delegates at the 1951 annual session.

*Committee on Local Arrangements, 1953 session* • Cleveland dentists who were appointed subcommittee chairmen for the 1953 session are Payer J. Warren, H. J. Guerink, Samuel S. Cohen, John T. Reifke and Louis C. Meier. Mrs. Herbert J. Hoppe of Cleveland will be chairman of the women's committee. Walter J. Pryor of Cleveland had previously been announced as chairman of the committee on local arrangements.

*Committee on Local Arrangements, 1954 session* • Curtis A. Haggard of Miami, Fla., was named chairman of the local arrangements committee for the 1954 session in Miami. Dr. Haggard will be assisted by S. Hill Gordon, George J. Coleman, Raymond J. Smith, James E. Edwards, H. Rogers Turner and Charles L. Craig.

### INSURANCE PROGRAMS

In March, the Board approved an extension of coverage under the Association's group life insurance program. The sum of insurance was increased from $3,450 to $5,000 with double indemnity coverage, and provision was made for a paid-up insurance policy to be paid to those covered by the program when they reach the age of 76.

A health and accident insurance program for Association members was approved by the Board at the same meet-

ing, "to supplement and not replace existing state and local dental society group programs."

### PROTECTING PUBLIC INTEREST

After consideration of the complaint lodged by the Federal Trade Commission against the American Association of Orthodontists, the Board reported a decision to take "such action as may be indicated from time to time to protect the rights of the dental profession as it relates to the ability of the profession to serve the public in an essential health service."

### OTHER BOARD ACTIONS

The Board likewise authorized the preparation of a history of the Association, to mark its centennial celebration in 1959. It also placed in the 1953 budget an allocation of $4,200 to the Fédération Dentaire Internationale, as the Association's annual membership assessment.

A new rule was adopted by the Board, providing for an annual rotation in the seating order of District delegations in the House of Delegates.

The Board commended constituent dental societies for the record contribution of $94,204.56 to the 1952 Relief Fund of the Association, and acknowledged with appreciation a bequest of $500 made to the Fund by Victor H. Knapp of Indiana. The report of the Board also disclosed that the restricted reserve of the Association is now $1,129,077.50.

## GENERAL MEETING AND OTHER EVENTS

"There are two major phases involved in safeguarding the future independence of your profession. One is the alert insistence upon excellent progress in the dental service provided for the people. The other is the recognition of the manner in which the status of your profession is interrelated to the freedom of other professions and groups within the country."

With these words, Harold E. Stassen, president of the University of Pennsylvania, stated the thesis of his talk on "Dentists and Freedom," at the general meeting of the annual session September 9.

Regarding the first phase, Mr. Stassen said: "An intelligent awareness of the gaps now existing in dental service to the people should lead directly to constructive steps to fill these gaps. This is a responsibility of your profession which in the years ahead can be neglected only at the peril of the standing of the profession."

After commending the Association for its "forward view" on the fluoridation of drinking water, he added, "The profession must never be smug about its status. A complacent profession is ripe for socialization."

In discussing the second phase involved in safeguarding freedom, Mr. Stassen stated that the dentist has a stake in the freedom of basic industries, retail stores, farm land, education and capital.

"Through an alert interest in these fundamentals, the dentists of America will continue to be free," Mr. Stassen concluded, "and likewise they will continue to contribute to the freedom, as well as the health and well-being, of the people of America.

The general meeting was also addressed by LeRoy M. Ennis, Retiring President of the Association, who commended American dentists for their "leadership and guidance" in the fluoridation program.

"When the history of the dental profession is written—and indeed, when the great epochs of public health are evaluated—the dental profession's role in fluoridation will be recognized for what it is: an unselfish effort on the part of thousands of dentists to improve dental health through community awareness and community action," Dr. Ennis said.

He listed as major problems of the dental profession the continued maintenance of adequate dental manpower for the nation, maintenance of sound dental health of the men and women in the Armed Forces, and the defeat of groups seeking a political approach to the health problems faced by United States citizens.

### PRESIDENT'S BANQUET

On the evening of September 10, more than 1,000 persons attended the formal banquet and program of musical entertainment honoring President LeRoy M. Ennis. The event, which was held in the Gold Room of the Hotel Jefferson, saluted Dr. Ennis on the evening of the completion of his administration.

Dr. Ennis declined to break the "no speeches" rule, but expressed his gratitude to those present. Henry F. Westhoff of St. Louis, chairman of the local arrangements committee, introduced Dr. Ennis and the other officers and trustees of the Association.

### INSTALLATION CEREMONIES

At the final meeting of the House of Delegates, LeRoy M. Ennis introduced the new officers and trustees of the Association, and in the midst of an ovation, presented the gavel of the Presidency to Otto W. Brandhorst, incoming President of the Association.

In a short acceptance speech, Dr. Brandhorst pointed to the amazing growth of "this magnificent structure—the American Dental Association," and to the public confidence which the dental profession enjoys in the United States.

The reason for this growth and public acceptance, said Dr. Brandhorst, is contained in the statement of the object of the Association: "to encourage the improvement of the health of the public and to promote the art and science of dentistry."

He reminded his audience that the Association's tradition of public service must be conditioned. "As a profession, we can exist only if these are our first consideration," he stated.

In the days ahead, let us continue to build on the foundation of service to the public. The span from the filling and extraction of teeth a few years ago to an important oral health service has brought with it a rare opportunity for a broader service to humanity. But let us not be smug or complacent, as Governor Stassen stated.

Let us find ways and means for a broad financial support for our underlying structure —dental education—to assure the continuance of the personnel to serve.

Let us expand our efforts in research in the cause of oral diseases and make prevention and control even more applicable. This is the true mark of a profession.

Let us find ways and means to extend our services to all those wishing it.

Let us strive to provide the best dental health service to the American people.

If we can reach these goals, our organization, the American Dental Association, through the service of the profession will reach even greater heights of usefulness and American Dentistry will justly flourish in its service to the American public.

To this end, I ask your cooperative effort. To this end, I pledge you my best endeavors.

### GUEST SPEAKERS

The support of the American Dental Association in obtaining legislation similar to the Reed-Keough bills, was urged by Edward J. McCormick, president-elect of the American Medical Association, in an address to the opening session of the House of Delegates.

"We believe the Reed-Keough bills,

Maj. Gen. George E. Armstrong, Surgeon General of the Army, is shown as he addressed the opening session of the House of Delegates at the 93rd annual session of the American Dental Association.

which would enable the practitioner to set aside a certain percentage of his income for a retirement fund, would be a fine arrangement for your practitioners and ours, and for lawyers and engineers as well," Dr. McCormick said.

James R. McVay, trustee of the American Medical Association from Missouri, also greeted the House of Delegates.

Maj. Gen. George E. Armstrong, Surgeon General of the Army, told the House that all available Priority I and II dentists will be in service by the end of the year. "In 1953," he said, "dentists under 51 who have had no military service since 1940, will be liable to the draft."

He also remarked that, should Public Law 779 be extended beyond July 1, 1953, in its present form, the requirements of the Armed Forces will exceed the number of available dentists by 1,600 in 1954 and by 3,000 in 1955. The effect of current discharges will compound the problem, he concluded.

General Armstrong asked the House to consider seriously whether the Association wants Public Law 779 extended, modified or discontinued at its expiration date next July.

### OTHER HIGHLIGHTS

A total of 900 women attended the luncheon and style show presented for the wives of Association members September 9 at the Chase Club of the Hotel Chase. The event was arranged by the Women's Entertainment Committee, of which Mrs. Earl C. Bean was chairman.

An evening cruise on the Mississippi was taken aboard the steamer *Admiral* on the opening night of the annual session. Other tours included trips to the Forest Park Zoo and the Anheuser-Busch Company.

The annual luncheon of the Past Presidents' Club was held September 10, and the annual golf tournament of the American Dental Golf Association was played September 8.

## FORUM ON DRAFT OF DENTISTS

The military services will need a standing force of 7,000 dental officers during the next three years, it was reported September 9 at the open forum convened by the Special Committee on National Emergency Dental Service to discuss the future dental manpower needs of the Armed Forces.

The forum was moderated by Rudolph H. Friedrich of Plainfield, N. J., chairman of the Council on Federal Dental Services. Reporting for the separate

armed services were the three chiefs of dental service: Maj. Gen. Walter D. Love, USA; Rear Adm. Daniel W. Ryan, USN, and Brig. Gen. Marvin E. Kennebeck, USAF.

Other participants were Col. Richard H. Eanes, chief medical officer of the Selective Service System; James P. Hollers, dentist member of the Armed Forces Medical Policy Council; Leo J. Schoeny, dentist member of the National Advisory Committee to Selective Service, and Eugene R. Westcott, chairman of the Council on Dental Education.

### ARMY TO TAP PRIORITY III

Between now and next June 30 the Army Dental Corps will need 1,200 men, of whom a substantial number must come from Priority III, it was revealed by Maj. Gen. Walter D. Love, chief of the Army dental division.

As recent dental school graduates with no previous military service will be called first, they will probably fill the needs of the Army during the remainder of 1952, General Love stated. Older registrants in Priority III will not be called until 1953, he added, but warned that the peak demand for dental officers will come in February, when the Army will need 500 dentists as replacements for those now on duty.

### NAVY TO USE RESERVES

Although the Navy will require 250-275 additional dental officers during the remaining months of 1952, it will be able to meet these needs through volunteers and its own Priority II Reserves, reported Admiral Ryan.

A total of 2,065 more dental officers will be needed by the Navy during the next three years, he revealed—575 during 1953, a peak of 850 during 1954 and 640 in 1955.

"We estimate that we can produce through our programs upwards of 550 of these. This figure, of course, is subject to some revision. This leaves a balance of some 1,500 dentists to be obtained from other sources within the next three years," Admiral Ryan concluded.

### ROTATION HITS AIR FORCE

A 70 per cent turnover in dental officer personnel every two years complicates the procurement problem of the military services, observed General Kennebeck. At the present time, he said, the Air Force has a deficit of 373 dentists, and by next June it will need 632 more dental officers to replace those lost through rotation.

Present procurement plans of the Air Force will bring 990 dentists into service by June.

During the next three years, the Air Force plans an "even flow" of 66 new dental officers each month and assumes that each will serve a minimum of two years. General Kennebeck reassured dentists that his department will not intensify the call-up of dentists before the expiration of Public Law 779, as this would upset the desired "even flow" of procurement.

He also reassured older dentists that younger Priority III registrants would be called first. "For obvious reasons," said General Kennebeck, "the more mature dentists of age 40 and over, especially if in substantial numbers and with no previous military service, do not effectively fit into the military picture."

### SELECTIVE SERVICE REPORTS

Dental officers are needed more than ever before, because the dental standards for induction of enlisted men "have been reduced until they are practically nonexistent," reported Leo J. Schoeny, dentist member of the National Advisory Committee to Selective Service. "This naturally has the effect of increasing the need for the services of dental officers."

The 1951-1952 officers and trustees of the Association are shown at a board meeting preceding the House of Delegates session. Seated (l. to r.) are H. B. Washburn, St. Paul, treasurer; Oscar Snyder, Washington, D. C., third vice-president; P. M. Cunningham, Cheyenne, Wyo., second vice-president; David J. Fitzgibbon, Washington, D. C., first vice-president; LeRoy M. Ennis, Philadelphia, president; Harry Lyons, Richmond, Va., speaker of the House of Delegates; Otto W. Brandhorst, St. Louis, president-elect; Harold Hillenbrand, Chicago, secretary, and Miss Janna Q. Olson, official stenotypist.

Standing (l. to r.) are C. S. Renouard, Butte, Mont.; Lon W. Morrey, Chicago, editor; J. J. Hollister, Chicago, business manager; Obed H. Moen, Watertown, Wis.; W. R. Alstadt, Little Rock, Ark.; James E. John, Roanoke, Va.; L. M. Cruttenden, Chicago, assistant secretary; Percy T. Phillips, New York; Daniel F. Lynch, Washington, D. C.; J. B. Carr, Indianapolis; W. Earle Craig, Pittsburgh; Bernard C. Kingsbury, San Francisco; C. S. Foster, Cedar Rapids, Iowa; Charles I. Taggart, Burlington, Vt.; Henry F. Westhoff, St. Louis, general chairman of the annual session; Robert P. Thomas, Louisville, Ky.; L. H. Jacob, Peoria, Ill., and Miss Doris Nugent, Chicago, administrative assistant.

Leslie M. FitzGerald (left), addresses the House of Delegates after his election to the office of president-elect of the Association.

Among the speakers at the open forum on the military draft of dentists were the chiefs of the Armed Forces dental divisions (l. to r., below): Maj. Gen. Walter D. Love, DC, USA; Brig. Gen. Marvin E. Kennebeck, DC, USAF, and Rear Adm. Daniel W. Ryan, DC, USN.

In ceremonies closing the 93rd annual session, the retiring president of the Association, LeRoy M. Ennis, presents the gavel to the incoming president, Otto W. Brandhorst (left), and accepts a Past President's pin from Clyde E. Minges (right, below), president of the Association in 1948-49.

RIGHT: Guest speaker Harold Stassen, president of the University of Pennsylvania and former governor of Minnesota, chats with three Minnesotans: John Knutson, chief dental officer of the USPHS; H. B. Washburn, treasurer of the Association, and Louis M. Cruttenden, assistant secretary of the Association.

BELOW: View of the House of Delegates in session.

The Committee sees no change, however, in the ratio of two dentists per 1,000 authorized strength of the Armed Forces.

Colonel Eanes, who summarized the induction program of the Selective Service System, revealed that there are 14,724 dentists registered in Priority III out of 36,788 dentists who were registered under Public Law 779.

Colonel Eanes announced that Selective Service would call up 200 more dentists in October and 200 in November, in addition to the 90 who were called during September.

### TOTAL NEEDS PREDICTED

The Defense Department's estimate of total needs during 1953-56 was revealed by James P. Hollers, dentist member of the Armed Forces Medical Policy Council of the Department of Defense.

"The Armed Forces estimate that their total authorized strength over the next three years will approximate 3,600,000 persons on active duty," Dr. Hollers disclosed. "Under authorized ratios this would require about 7,200 dentists. Actually the dental services are operating and intend to continue to operate on a basis of 6,950 dental officers."

### DENTAL SCHOOLS SEEK TEACHERS

"Dental education cannot be conducted by aggregates of men who are called teachers and who must be replaced every three or six months because of the continued loss of essential men and the prospect of losing still more," said Eugene R. Westcott, chairman of the Council on Dental Education, who stated the problem of the dental schools.

The recruitment of trained dental educators who will not be called into service is a major problem, he said.

The reservoir of students desiring to study dentistry is sufficiently large, he added, "that no concern need be given as long as we have the assurance (1) that there will continue to be a mechanism for maintaining this supply, and (2) that the successful dental students will be permitted to continue their dental education until graduated."

Following the presentation of the papers, speakers answered questions from the audience.

## INTERNATIONAL GUESTS

The president of the Mexican Dental Association, Roman S. de Lascurain, presented honorary memberships in his organization to LeRoy M. Ennis of Philadelphia, retiring president of the American Dental Association, and Harold Hillenbrand of Chicago, Association secretary, during an address to the opening session of the House of Delegates.

Dr. de Lascurain commended the American Dental Association for its policy of active cooperation with the dental profession in other countries, and awarded a citation to Don Jose Aubertine of San Francisco, chairman of the American Dental Association's Council on International Relations.

Awards were also presented to Dr. Ennis and Otto W. Brandhorst, incoming president of the Association, by representatives of the Philippine Dental Association, Honduras Dental Association and the Dental Association of Lebanon.

International dental leaders who addressed the opening session of the House of Delegates included W. Alan Grainger of Sydney, Australia; Don W. Gullett of Toronto, Canada, and M. H. Garvin of Winnipeg, Canada.

Among the many dentists present from

Canada were Armand Boisvert of Montreal; Col. C. B. Climo of Ottawa; Owen L. Croft of Halifax, N. S.; Henry Freeland of Calgary; Gerald Franklin of Montreal; Edmund A. Grant of Toronto; B. M. Harley of St. Catharine's, Ont.; Harry Hoffer of Regina, Sask.; Alvin M. Hurd of Toronto; R. A. Meharry of Windsor; M. C. Mills of French Mills, Ont.; D. P. Mowry of Montreal; Maj. S. K. Oldfield of Ottawa; A. V. Orro of Toronto; Gerald Plant of Vancouver, B. C.; Henry A. Thompson of Toronto; Harry S. Thompson of Toronto and Ernest Charron of Montreal.

Visitors from the Philippines included Germanico A. Carreon, Col. Miguel R. Fernandez, Hon. Ricardo Y. Ladrido, Manuel P. Arenas and Gaudencio R. Ocampo, all from Manila.

Latin American dentists who attended included Manuel Conejo and Ernesto Figueredo, both of Havana, Cuba; Julio Alfonzo and German Salazar of Caracas, Venezuela; R. T. Landois of Monterrey, Mexico, and Carlos Pucheu of Veracruz, Mexico; José Amaya de Vicente of San Salvador, El Salvador; Juan Pablo Urrea of Cali, Colombia, and José Arroyo Valdés of the Dominican Republic.

Other international guests were Terk Charudilaka of Bangkok, Thailand; W. G. Cross of London, England; Maria Davis of Athens, Greece; Josse De Wever of Antwerp, Belgium; Paul Di Dondey of Grenoble, France; Juuso Kivimaki of Helsinki, Finland; Eleanor M. Knowles of London, England; A. D. Lazarus of Tegucigalpha, Honduras; Arthur Lissack of Durban, Natal, South Africa; Hans Muhlemann of Zurich, Switzerland; Ole Soested of Copenhagen, Denmark; H. H. Srabian of Beirut, Lebanon; Arthur Thornton Taylor of Sydney, Australia, and Isra Yuktanandana of Bangkok, Thailand.

## DENTAL HEALTH CONFERENCE

A "pilot" prepayment group plan which would cover treatment given in the dentist's office was outlined by Bernard Clug, representing the First District Dental Society of New York, in a discussion of prepayment and postpayment health plans September 6, at the third annual Dental Health Conference conducted by the Council on Dental Health.

The proposed Group Health Dental Insurance, Inc., of New York, said Dr. Clug, is a prepayment plan in which 25,000 patients and 7,000 dentists could participate. Its keystone is the provision for complete rehabilitation of the patient's mouth when he enters the plan; the patient would pay a maximum of $150 for this treatment and the plan would pay the rest, Dr. Clug explained. "The plan then becomes a maintenance plan," he added.

It is proposed that participating families be limited to those whose annual income is less than $5,000. The annual premium for a single person would be $19.80; for a couple, $39.60, and for a family of three or more, $72. The insured persons would have a choice of dentist, and all financial transactions would be handled through a central office. Dr. Clug concluded.

### BLUE SHIELD PLANS

Group dental health plans may be conducted on the same basis as medical prepayment plans provided that certain conditions are present, stated the director of the Blue Shield Medical Care Plans, Frank Smith of Chicago. He listed the following seven principles for a successful health insurance plan:

Shown at the State Society Officers Conference were (l. to r.) Harold Hillenbrand, Association secretary; Otto W. Brandhorst, Association president; John Benediktson, president of the State Society Officers, and LeRoy M. Ennis, retiring president of the Association.

1. The risk must be capable of being subjected to the laws of mathematical probability.
2. The persons to be insured must have a personal loss interest.
3. There must be a large number of insured persons, scattered as widely as possible in different areas.
4. The risk must be important to the insured persons.
5. There must be an uncertainty of the occurrence of the risk.
6. The risk must be capable of long range insurability.
7. The writing of the insurance must not increase the probability of the risk's occurring.

Under such conditions, Mr. Smith said, a dental prepayment plan would be sound.

John Looby and Ray Cobaugh, representing the Pennsylvania State Dental Society, explained the Society's experience with Blue Shield group insurance for dental care. The dental benefits under the plan cover a limited number of dental operations which present considerable financial risks to the patient, they revealed.

### POSTPAYMENT PLANS

"The most important reason for a postpayment plan is that it puts dental service within the reach of more people," remarked Ralph H. Campbell of Detroit, in an evaluation of postpayment plans for financing dental care.

These plans should have three purposes, Dr. Campbell stated. "They should reduce the cost of professional services to the patient; improve relations between the public and the profession, and increase the net income to dentists using the plan."

To insure the success of the plan, the dental society must retain strict control of it and must educate the participating dentists in its use, Dr. Campbell advised.

"The bank which handles the financial negotiations—the third party—must be one which has an established personal loan service," he added. No co-signer should be necessary, a low discount rate must be granted, and a credit investigation of participants is advisable, he concluded.

Carl F. Vohs, chairman of the Missouri State Medical Association's committee on medical service, commented on the views of all speakers on prepayment and postpayment group plans.

### FLUORIDATION PROGRAMS

The Conference on Dental Health concluded with talks on the public health aspects and the legal problems of fluoridation programs, presented by W. Philip Phair, assistant secretary of the Council on Dental Health, and Francis J. Garvey, secretary of the Council on Legislation.

Kenneth A. Easlick of Ann Arbor, Mich., member of the Council on Dental Health, summarized the talks of all participants in the Conference and reviewed the findings which had been reported.

## STATE SOCIETY OFFICERS

The Conference of State Society Officers of the American Dental Association, which met September 7, installed Earle S. Arnold of West Hartford, Conn., as president to succeed John B. Benediktson of Oakland, Calif.

Other officers of the organization for 1952-53 are Donald MacKay of St. Paul, vice-president, and Wayne L. McCulley of Cleveland, Tenn., secretary.

The all-day program of the Conference included discussions of Children's Dental Health Day, the use of motion pictures in public health education, fluoridation, operation costs of a state society and civil defense activities.

The methods used by the Cleveland Dental Society to gain community interest in Children's Dental Health Day were outlined by Henry E. Kelly of Cleveland. "You must have a definite program before you ask the cooperation of school authorities, newspapers, and radio and television celebrities," Dr. Kelly emphasized.

He suggested that school authorities be consulted first. "Since the schools prefer a continuous program that will fit into the curriculum," he said, "the dental society might suggest a poster contest for art students or a mouth hygiene program for health classes. In Cleveland, both are employed."

After the program has been determined, various activities can be sponsored and publicized by the media of public information. Two Cleveland newspapers have sponsored the poster contests and the mouth hygiene program and have publicized their activities effectively, Dr. Kelly told the Conference.

On the Sunday before Children's Dental Health Day, the Dental Society presents a children's party in the Cleveland Music Hall. Celebrities from children's television shows and from the Cleveland baseball team appear in person; door prizes include bicycles and dolls; a short program on dental health is presented through films and talks.

Dr. Kelly pointed out that a publicity committee must be well-informed on the events to be presented and must be familiar with newspaper, radio and television personnel. In Cleveland, he said, an annual party is staged for the press, radio and television personnel, to remind them of coming events and to express gratitude for their past cooperation.

### FILMS ON DENTAL HEALTH

A plea for more motion pictures of value in public health education was presented by John Abel of Beverly Hills, Calif., who told of the experience of the Southern California Dental Association in producing a film. Although the organization had to finance the motion picture, "It's Your Health," it has regained the investment by selling 540 copies of the film to state health departments, dairy councils and other societies.

Greater use of films on dental subjects was urged by Helaine Levin, film librarian of the American Dental Association, in her presentation to the Conference. Miss Levin explained that constituent and component dental societies may obtain information on films and may rent them from the Association's library. She also explained the Association's policies on reviewing the films, purchasing them and circulating them.

### DENTISTS AND FLUORIDATION

"Dentists must inform themselves so they have the answers to questions about fluoridation," said John Frisch of Madison, Wis., in his talk on "Fluoridation: The Greatest Public Health Bargain." Dr. Frisch stressed that the public looks to the dental profession for scientific statements on fluoridation, and warned that dentists who do not have the facts

at their fingertips will be unable to answer widely-circulated charges against this measure.

"Fluoridation is the cheapest municipal service that citizens can buy," said Dr. Frisch. He pointed out the benefits which result from the investment of a few cents each year, in comparison to other municipal services.

During his talk, Dr. Frisch introduced and called from the audience Frederick McKay, pioneer investigator of fluoridated water.

Other speakers on the Conference program were John G. Rooks, executive secretary of the California State Dental Association; W. Earle Craig, Trustee of the Third District; James Robinson, executive secretary of the Southern California State Dental Association; Ralph H. Campbell of Detroit, and James E. Weedin, president of the Missouri State Dental Association.

In the concluding session of the Conference, civil defense activities were discussed by Russell W. Bunting, dental consultant to the Federal Civil Defense Administration, and David E. Hunn, chairman of the Subcommittee on Civil Defense of the Association.

At the State Society Officers' annual luncheon, the principal speaker was Otto W. Brandhorst, incoming president of the American Dental Association. LeRoy M. Ennis, retiring president, also greeted the Conference.

## ASSOCIATED GROUPS

*The American Academy of the History of Dentistry* held its first annual meeting September 6, at which a constitution was adopted and officers were elected. J. Ben Robinson of Baltimore, retiring president, installed Arthur H. Merritt of New York as president. The Academy named L. Laszlo Schwartz of New York, president-elect; William N. Hodgkin of Warrenton, Va., vice-president; Harold L. Faggart of Philadelphia, secretary-treasurer; Gardner P. H. Foley of Baltimore, editor, and Milton B. Asbell of Camden, N. J., executive committee member.

At its luncheon meeting, the Academy was addressed by John Francis McDermott of Washington University, St. Louis. Earlier the organization heard papers by L. Laszlo Schwartz of New York, George B. Denton of Chicago and Nell Snow Talbot of Chicago.

*American Academy of Implant Dentures,* at its first annual meeting September 7, elected Norman I. Goldberg of Providence, R. I., president; Aaron Gershkoff, also of Providence, president-elect; Wayne Paullus of Miami, vice-president; Philip Loechler of Rochester, Minn., secretary, and E. J. Kresse of Denver, treasurer.

*The American Academy of Periodontology,* after installing Roy O. Elam of Nashville, Tenn., as president, elected Harry Lyons of Richmond, Va., to the office of president-elect. All other officers were re-elected, as follows: Clarke E. Chamberlain of Peoria, Ill., secretary; Raymond E. Johnson of St. Paul, Minn., treasurer, and Maynard K. Hine of Indianapolis, editor. Arthur H. Merritt and Harold J. Leonard, both of New York, were re-elected members of the American Board of Periodontology.

*American Association of Dental Editors,* meeting September 6, voted to publish a new edition of its *Manual for Dental Editors,* after accepting gifts of $750 from the William J. Gies Foundation and $100 from Arthur Merritt for this purpose.

The organization installed Loren B. Taber of San Francisco as president, succeeding Dorothy F. Radusch of Minneapolis. Walter C. McBride of Detroit, former secretary-treasurer of the organization, was named president-elect. Other officers for 1951-52 are W. W. MacQueen of Minneapolis, vice-president; L. F. Bumgardner of Charlotte, N. C., secretary-treasurer, and Willard Ogle of Dallas, Texas, editor.

During its business session, the A.A.D.E. also voted to raise its annual membership dues, for both publications and individuals.

At a joint meeting of the Council on Journalism and the American Association of Dental Editors, papers were presented by J. C. A. Harding of San Diego and Willard Ogle of Dallas, both dental editors; Alfred Fleishman, a public relations counsel of St. Louis; L. A. Batterson, sales manager of a St. Louis printing firm, and Ralph Rosen, editor of the St. Louis Dental Society's publication.

*The American Association of Dental Examiners*, at its 69th annual meeting September 6, elected Herbert L. Bunker of Junction City, Kan., to the presidency of the organization, to succeed John M. Hughes of Richmond, Va. Carl L. Bumstead of Lincoln, Neb., was re-elected secretary.

Other officers for 1952-53 are: Archie A. Albert of Pawtucket, R. I., first vice-president; Russell I. Todd of Richmond, Ky., second vice-president, and Vernon L. Hunt of Eureka, Calif., third vice-president.

*The American Association of Public Health Dentists* announced the following roster of officers for the coming year at the close of its annual meeting September 7:

Carl L. Sebelius of Nashville, Tenn., president; Francis A. Bull of Madison, Wis., president-elect; Roy Smiley of Indianapolis, secretary-treasurer, and Polly Ayers of Birmingham, Ala., and David Witters of Portland, Ore., members of the executive council.

Dr. Sebelius, director of dental hygiene service for the Tennessee Department of Public Health, succeeds Philip E. Blackerby, Jr., of Battle Creek, Mich.

During its scientific program, the public health dentists heard papers by John T. Fulton of Washington, D. C.; Woodrow O'Brien of St. Louis; David W. Brock of St. Louis, and Olin E. Hoffman of Seattle.

*American College of Dentists* conferred the degree of Fellow of the College on 143 dentists of the United States and Canada, at its annual meeting September 7. The College also installed Fritz A. Pierson of Lincoln, Neb., as president. Harry Thompson of Toronto, Canada, was chosen president-elect; Wilbert Jackson of Clinton, N. C., and E. Frank Inskipp of San Francisco were chosen regents for the coming year.

*American Dental Assistants Association*, meeting September 7-11, elected Marie Johnson of Portage, Wis., president; Lillian Hoffman of Akron, Ohio, vice-president; Harriett Darling of Huron, S. D., secretary and Lorena Hunsecker of Newton, Kans., treasurer.

*American Dental Hygienists Association*, at its twenty-ninth annual meeting, September 8-11, installed the following officers: Evelyn Hannon of Portland, Ore., president; Laura Peck of New London, Conn., president-elect; Sara Hill of Memphis, first vice-president; Marjorie Thornton of Sioux City, Iowa, second vice-president; Alice Scales of Washington, D. C., third vice-president, and Ruth Heck of Philadelphia, treasurer.

*The American Denture Society* held its twenty-fourth annual meeting September 6, at which Chester Perry of Detroit was

installed as president, to succeed John R. Wallace of Winchester, Mass.

Other officers of the Society for the coming years are: Victor L. Steffel of Columbus, Ohio, president-elect; Cecil H. Bliss of Sioux City, Iowa, vice-president, and Arthur L. Roberts of Aurora, Ill., secretary-treasurer.

Newly elected members of the executive council are Emil Bollwerk of St. Louis, Thomas E. J. Shanahan of Brooklyn, and Ralph H. Libberton of Chicago.

*The American Society of Dentistry for Children* awarded honorary life memberships to Mrs. DeLos Hill of Atlanta and Samuel Harris of Detroit, at the Society's annual meeting, September 6-7. Mrs. Hill is founder and sponsor of the children's dental clinic at the Atlanta-Southern Dental College, Emory University; Dr. Harris is founder and past president of the Society.

The life memberships were conferred at a silver anniversary dinner at which Walter C. McBride of Detroit, first president of the Society, spoke. The Society re-affirmed the action it took last year in supporting the fluoridation of public water supplies as an anti-caries measure for children's dental health.

George W. Teuscher of Barrington, Ill., was installed as president of the Society for the coming year; Hugh Keenan of Corning, N. Y., formerly vice-president, was named president-elect, and Willard Hunnicutt of Atlanta, Ga., was elected vice-president. Henry Wilbur of Louisville, Ky., was re-elected to the post of secretary-treasurer.

The two new members of the Society's executive council are Albert Anderson of San Diego, Calif., and Harold Maxmen of Detroit.

*The International College of Dentists* on September 7 installed Oren A. Oliver of Nashville, Tenn., as president and elected the following officers: William N. Sexton of Bristol, Va., president-elect; Willard S. Bell of New York, vice-president; R. Gordon Agnew of San Francisco, treasurer, and Elmer S. Best of Minneapolis, Minn., secretary-general.

*National Association of Seventh-Day Adventist Dentists,* meeting September 4-7, announced that $300,000 has been contributed toward the building of the proposed College of Medical Evangelists School of Dentistry, Loma Linda, Calif. Members present at the meeting pledged $68,800 on the evening of September 6, following an address by W. Ross Stromberg of Ann Arbor, Mich., president of the National Association of Seventh-Day Adventist Dentists. Dr. Stromberg will be assistant dean of the school; M. Webster Prince of Detroit is dean.

The organization, composed of 200 members, re-elected Dr. Stromberg president for the coming year. Other officers were also re-elected; they are: Elder Carl Sundin of Los Angeles, chaplain; Walter C. Dorn of Silver Spring, Md., vice-president, and Franklyn C. Nelson of Pomona, Calif., secretary-treasurer. Rollin Mallernee of Atlanta, Ga., was elected editor.

## Armed Forces

### NAVY ANNOUNCES RETIREMENT OF ADMIRAL A. W. CHANDLER

Rear Admiral A. W. Chandler, DC USN, Inspector General of the Navy Dental Corps, was retired to inactive duty October 1, after more than 35 years of continuous active duty.

Admiral Chandler was formerly chief of the dental division and assistant chief of the Bureau of Medicine and Surgery for Dentistry, and was the first officer of the Naval Dental Corps to serve in this post. He is a diplomate of the American Board of Prosthodontics, a Fellow of the American College of Dentists and

Admiral
A. W. Chandler

a former vice-president of the American Dental Association.

A graduate of the University of Pennsylvania dental school in 1915, Admiral Chandler conducted a private practice until his entrance into the Navy in 1917. During his Navy career, he served as a dental officer aboard ship and in installations all over the world.

### MEDICO-MILITARY SYMPOSIUM TO INCLUDE DENTAL SESSIONS

For the first time, the dental corps of the armed services will participate in the annual Medico-Military Symposium for the Armed Forces, to be presented October 20-25 at the U. S. Naval Hospital, Philadelphia.

Two special sessions assigned to dentistry will be presided over by Capt. Clay A. Boland, DC, USNR. Lectures at the first session, on the afternoon of October 21, will include LeRoy M. Ennis on oral roentgenology; Col. Jack B. Caldwell, DC, USA, on the initial clinical examination of traumatic injuries of the jaws, and Cmdr. John V. Niiranen, DC, USN, on special prosthesis.

The second dentistry section, on the afternoon of October 23, will include lectures on oral surgery by James R. Cameron, on oral pathology by Cmdr. Robert A. Colby, and on integration of services in treatment of cleft lip and cleft palate by Herbert K. Cooper.

Dental exhibits of interest will be presented under the direction of Capt. Jack H. Sault, DC, USN. Arrangements have been made to give point credits for those in attendance, including Army, Air Force and Navy Reserve officers who are not on the inactive status list.

### NAVY DENTAL CORPS REPORTS ON 40 YEARS OF SERVICE

The Navy Dental Corps recently observed the fortieth anniversary of its establishment with a report on its current Korean service, its Naval Dental School and its dental research programs.

In Korea, the report disclosed, 27 Navy dental officers and enlisted men serving with the Marines have been decorated. Awards to dental officers include a Silver Star, five Bronze Stars, an Army Bronze Star and eight Letters of Commendation with Ribbon and Combat "V" Insignia. Enlisted men were awarded a Navy Cross, a Silver Star, a Bronze Star and eight Letters of Commendation with Ribbon and Combat "V" Insignia.

A review of the achievements of the Naval Dental School at Bethesda, Md., cited the development of a new mouthpiece for protecting athletes' teeth from injury, a facsimile arm used for training auxiliary medical personnel, a third molar extraction training device and the acrylic artificial eye which the maxillofacial department developed during World War II.

### ASSISTANT CHIEF OF ARMY'S DENTAL DIVISION RETIRES

Brig. Gen. Neal A. Harper, DC, USA, retired August 31 after more than 35 years of active military service. General Harper was assistant chief of the dental division in the office of the Army Surgeon General, Washington, D. C.

A graduate of the St. Louis University College of Dentistry, General Harper

Brig. Gen. Neal A. Harper, DC, USA (left) is congratulated on 35 years of distinguished service by Maj. Gen. George E. Armstrong (right), Surgeon General of the Army, at ceremonies marking General Harper's retirement. He was assistant chief of the dental division, Office of the Surgeon General.

received a commission in the Army Dental Corps in 1916, after serving an internship at St. Elizabeth's Hospital, Washington, D. C. During his military career, he served in the Panama Canal Zone, the Philippine Islands, Hawaii, China and Germany, as well as in many installations within the United States. He was awarded the Legion of Merit for service in World War II.

General Harper is a member of the American Dental Association, the American Association of Orthodontists and the Association of Military Surgeons; he is a fellow of the American College of Dentists and vice-president of the St. Louis University Alumni Association.

### NAVY DEPUTY DENTAL CHIEF, CAPT. W. REHRAUER, RETIRES

Capt. Walter Rehrauer, DC, USN, retired September 1 as deputy chief of the Dental Division, Navy Bureau of Medicine and Surgery. Captain Rehrauer had served more than 34 years in the Navy Dental Corps and had been stationed at the Bureau of Medicine and Surgery for the past six years.

A native of New York City, he was graduated in 1914 from the Texas Dental College, Houston. During his Naval career, Captain Rehrauer received many honors, including a commendation from the Secretary of the Navy for his "exceptional and outstanding service" during World War II while directing the dental service which cared for more than 300,000 men at the Naval Training Center, Farragut, Idaho.

During a retirement ceremony August 29 in the office of the Surgeon General of the Navy, Captain Rehrauer was credited with being "directly responsible for many advances in the educational and training program for dental personnel."

## Dental Education

### SOUTHERN CALIFORNIA OFFERS GRADUATE ORTHODONTICS

A 16-month course in graduate orthodontics leading to a master of science degree, will commence February 3 at the University of Southern California dental school, it was announced recently by Robert W. McNulty, dean.

Interested dentists from all parts of the country have been invited to apply for admission to the course not later than December 10.

The curriculum will include the following courses: anatomy of head and neck, advanced oral histology, oral anatomy, advanced nutrition, oral pathology, endocrinology, orthodontics (advanced courses), psychological development of the child, roentgenographic cephalometry, seminar reviewing current dental literature. Research and a thesis on the graduate level are also required.

Spencer R. Atkinson, professor of orthodontics and head of the department, will direct the faculty.

Applicants may address inquiries to the University of Southern California School of Dentistry, 122 East 16th Street, Los Angeles 15.

### DENTAL SCHOOLS TO OFFER NEW POSTGRADUATE COURSES

*Pennsylvania* • During the remaining months of 1952, seven postgraduate courses for dentists and one course for dental assistants will be presented by the University of Pennsylvania dental school. The seven courses in dentistry include:

Airbrasive technic, to be presented twice—October 6-14 and October 17-25—by Jules E. Kneisel and Carl T. Leander.

General anesthesia in dentistry, one day per week October 7, 1952-February 3, 1953, by Claude S. LaDow and associates.

Oral surgery and anesthesia, daily November 10-15, by Thomas M. Meloy and associates.

Advanced practices in functional treatment, to be presented daily October 20-25 by Ernest R. Granger for those dentists who have taken previous courses with him and who desire more advanced practical instruction.

Partial dentures, one day per week November 17-December 22, by M. M. DeVan and associates.

Periodontal therapy, daily December 8-12, by Henry M. Goldman and associates.

Public health dentistry and dental health education for dentists and dental hygienists, daily December 1-4, presented by Abram Cohen and associates.

The course for dental assistants will be presented by Jules E. Kneisel and associates each Monday and Friday evening beginning October 20 and continuing for a total of 104 hours of instruction.

Further information and application blanks may be obtained by addressing inquiries to the director of postgraduate courses, School of Dentistry, University of Pennsylvania, 4001 Spruce Street, Philadelphia 4.

*Tufts* • Seven courses in airbrasive technic will be presented during the coming academic year by Tufts College Dental School. Six of the courses will last five and one-half days, meeting from 1:30 to 9 P.M. Monday through Friday and from 9 A.M. to 3:30 P.M. on Saturday. Dates of the courses are: December 15-20, 1952; January 26-31, March 23-28, June 1-6, July 6-11 and August 3-8, 1953.

An evening course, scheduled to meet on 10 evenings from 6 to 9:30 P.M., will be offered during February 5-21. All courses will be taught by J. Murray Gavel and staff.

Further information may be obtained from Irving Glickman, director of graduate and postgraduate studies, Tufts College Dental School, 136 Harrison Avenue, Boston 11.

## Veterans Administration

### BION R. EAST TO DIRECT VA DENTAL TRAINING CENTER

Bion R. East, who recently completed his four-year appointment as chief dental of the Veterans Administration, has been designated director of VA's first postgraduate dental training center at the VA Hospital now under construction on Chicago's west side.

The training center will be operated in cooperation with the dental school of the University of Illinois, Loyola University of Chicago and Northwestern University. The center will also be used for dental research, it was announced by Vice Adm. Joel T. Boone, chief medical director of the VA.

## General

### THREE DEATHS REPORTED AT ANNUAL SESSION

John G. Frisch of Madison, Wis.; George C. Jernigan of Rector, Ark., and E. R. Hayes of New York, died during the As-

sociation's annual session in St. Louis.

Dr. Frisch, who had been a principal speaker at the Conference of State Society Officers September 7, died a few hours after returning to his home September 11. He was 53 years old. Author of several papers on fluoridation, Dr. Frisch had engaged in research, in conjunction with Frederick McKay, on caries incidence in children who lived where fluorides occur naturally in water.

He was graduated from Marquette University dental school in 1922 and was in private practice in Madison. A past president of the Dane County Dental Society, Dr. Frisch was chairman of the fluorine committees of his County and State Dental Society. He served in the House of Delegates of the American Dental Association for several years.

George C. Jernigan, editor of the *Journal of the Arkansas State Dental Association,* died September 9 in St. Louis at the age of 68. Dr. Jernigan was graduated from St. Louis University dental school in 1913 and was in private practice.

E. R. Hayes, medical and educational director of Church and Dwight Co., died September 7 in St. Louis. Dr. Hayes, a physician, was credited with developing the company's program of distributing Association-approved pamphlets on dental health.

## ARGENTINE ORTHODONTISTS ANNOUNCE NOVEMBER MEETING

The Argentina Society of Orthodontics has invited members of the American Dental Association to participate in its sixth Orthodontic Sessions in Buenos Aires, November 16-19.

Any Association members who will be in Buenos Aires during that time and who may be able to attend the meeting are asked to communicate with Harold Hillenbrand, secretary, American Dental Association, 222 East Superior Street, Chicago 11.

## GREAT LAKES SOCIETY OF ORTHODONTISTS TO MEET

Guest speakers at the annual meeting of the Great Lakes Society of Orthodontists, November 9-12 in Toronto, Canada, will include the president of the University of Toronto, Sidney Smith, and the 1952 Grieve Lecturer of the Canadian Dental Association's orthodontics section, Spencer R. Atkinson of Pasadena, Calif. Gustav Ratte, president of the Canadian Dental Association, will address the Society at the opening session.

Round table question and answer forums have been scheduled to follow each of two scientific sessions which will feature papers by W. K. Krogman, John R. Thompson, D. H. M. Williams, Gordon S. Swann, Kyrle W. Preis, Charles R. Baker and Spencer R. Atkinson.

An afternoon session at Toronto's Hospital for Sick Children will consist of a tour of the hospital and lectures by A. L. Chute, physician-in-chief of the hospital, Harry Ebbs, S. A. MacGregor and E. H. McHendry.

Further information may be obtained from Carl R. Anderson, secretary-treasurer, 402 Loraine Building, Grand Rapids, Mich.

## LECTURE ON ORAL SYPHILIS TO OPEN NEW YORK SERIES

A British professor of dentistry will lecture on oral syphilis at the New York Academy of Medicine at 8:30 P.M., October 27, under the auspices of the New York Institute of Clinical Oral Pathology.

The Institute's first Herman L. Reiss Memorial Lecture will present Robert V. Bradlaw, professor at Sutherland Dental School, University of Durham, King's College, England. Further information may be obtained from Theodor Blum, secretary, New York Institute of Clinical Oral Pathology, 101 East 79th Street, New York 21.

# *Deaths*

Aitken, William J., Bethlehem, Pa.; School of Dentistry, University of Pittsburgh, 1922; died May 3; aged 54.

Aldous, Charles E., Passaic, N. J., College of Dentistry, New York University, 1893; died June 23.

Armstrong, Hugh F., Decatur, Ill.; Chicago College of Dental Surgery, Loyola University, 1898; died April 12; aged 77.

Askew, James B., Vicksburg, Miss.; Baltimore College of Dental Surgery, 1896; died May 6; aged 77.

Askey, Charles H., Bedford, Pa.; School of Dentistry, University of Pittsburgh, 1926; died June 8; aged 51.

Baker, Ralph V., Marshfield, Mass.; died May 3.

Barney, Roland S., Brookline, Mass.; Dental School, Harvard University, 1901; died May 27.

Bayne, Roscoe S., Henry, Ill.; Dental School Northwestern University, 1899; died April 20; aged 82.

Bender, Philip, Jr., Buffalo; School of Dentistry, University of Buffalo, 1920; died May 29.

Biron, Nazaire, Manchester, N. H.; died June 7.

Blackmer, George G., Wickliffe, Ohio; School of Dentistry, Western Reserve University, 1927; died May 27; aged 49.

Brumfield, Cecil W., Evansville, Ind.; College of Dentistry, University of Illinois, 1911; died June 6.

Butterly, Thomas J., Waterbury, Conn.; Medico-Chirurgical College of Philadelphia, 1911; died March 25; aged 65.

Carter, Lowell J., Elma, Iowa; College of Dentistry, University of Illinois, 1919; died May 8; aged 56.

Caulfield, Peter A., Woburn, Mass.; Dental School, Tufts College, 1894; died June 7; aged 78.

Chamberlin, Rollo G., West McHenry, Ill.; College of Dentistry, University of Illinois, 1902; died April 21; aged 78.

Church, Earl L., Port Huron, Mich.; College of Dental Surgery, University of Michigan, 1913; died May 23; aged 70.

Clegg, William J., Providence, R. I., Dental School, Tufts College, 1910; died May 23.

Davis, Harold B., Marion, S. C.; Atlanta-Southern Dental College, 1929; died February 27.

Dean, Marguerite T., Memphis, Tenn.; died April 21.

Douglass, John A., Ponca City, Okla.; College of Dentistry, Ohio Medical University, 1899; died January 10; aged 79.

Dwyer, James W., Minneapolis; Dental School, Marquette University, 1899; died May 30; aged 90.

Elifritz, William C., Springfield, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1894; died May 31; aged 88.

Farley, John W., Albuquerque, N. M.; Indiana Dental College, 1901; died June 2; aged 73.

Foley, John W., Corbin, Ky.; College of Dentistry, University of Tennessee, 1895; died February 27; aged 80.

Franco, Louis J., Los Angeles; College of Dentistry, University of Southern California, 1936; died June 2; aged 43.

Friedberg, Leo J., Brooklyn; College of Dental and Oral Surgery, New York, 1921; died April 24; aged 60.

Garrett, Jean B., Etowah, Tenn.; Atlanta Dental College, 1903; died May 25; aged 82.

Gerber, Solomon M., Bronx, N. Y.; College of Dental and Oral Surgery, New York, 1921; died May 31; aged 55.

Gould, Samuel C., Boston; Dental School, Tufts College, 1913; died June 7; aged 67.

Hatch, Myles E., Boston; Dental School, Tufts College, 1927; died June 15; aged 50.

Hazelrigg, Harry G., Paintsville, Ky.; Louisville College of Dentistry of Centre College, 1917; died June 3; aged 63.

Heldman, John P., Marietta, Ohio; Cincinnati College of Dental Surgery, 1916; died May 3; aged 62.

Hemminger, David M., Prairie City, Iowa; College of Dentistry, University of Iowa, 1903; died April 7; aged 73.

Henahan, Joseph P., Beverly Hills, Calif.; School of Dentistry, Western Reserve University, 1901; died June 19; aged 75.

Hiett, Will M., San Francisco; College of Dentistry, University of Iowa, 1903; died March 13; aged 75.

Hochberg, Paul, Bronx, N. Y.; College of Dentistry, New York University, 1909; died June 7.

Holtzman, Victor, Passaic, N. J.; New York College of Dentistry, 1919; died June 11; aged 64.

Horton, Hilliard B., Vinita, Okla.; died June 5; aged 85.

Howard, Newton U., Minneapolis; Marion-Sims Dental College, St. Louis, 1904; died June 12; aged 69.

Husch, Jacob, Brooklyn; College of Dental and Oral Surgery, New York, 1907; died June 1; aged 69.

Jack, L. Foster, Haverford, Pa.; School of Dentistry, University of Pennsylvania, 1885; died June 15.

Johnson, Ralph H., Abbeville, Ga.; Atlanta-Southern Dental College, 1910; died May 18; aged 70.

Kabei, Elmer S., Waialua, T. H.; School of Dentistry, University of Kansas City, 1944; died June 18; aged 33.

Kamenetzky, Max, Newark, N. J.; New York College of Dentistry, 1905; died June 2; aged 73.

Lackey, Louis A., Albany, N. Y.; New York College of Dentistry, 1922; died May 25; aged 54.

Lawlis, Thomas S., Lenora, Kan.; School of Dentistry, University of Kansas City, 1951; died May 21; aged 29.

Lewis, John H., Eugene, Ore.; died May 12; aged 77.

Lichtenstein, Herbert A., Bangor, Maine; Dental School, Tufts College, 1925; died June 13; aged 53.

Lipecki, John R., Chicago; Dental School, Northwestern University, 1919; died June 28; aged 56.

Loikrec, Olaf L., New Orleans; School of Dentistry, Loyola University, New Orleans, 1928; died May 31; aged 51.

Lowell, Walter E., Portland, Maine; School of Dentistry, Georgetown University, 1913; died June 10; aged 66.

Lupton, B. Mervin, Hackensack, N. J.; College of Dental and Oral Surgery, New York, 1922; died June 20; aged 56.

Marks, William C., Galesburg, Ill.; Chicago College of Dental Surgery, Loyola University, 1901; died April 26; aged 75.

Maurice, Arthur M., Monticello, Iowa; College of Dentistry, Drake University, 1901; died April 16; aged 72.

McKenzie, Morell D., New York; College of Dentistry, University of Minnesota, 1917; died May 31; aged 63.

McLeod, Henry M., Jackson, Ala.; Atlanta Dental College, 1908; died June 7; aged 70.

Mochel, John V., Reading, Pa.; School of Dentistry, University of Pennsylvania, 1918; died June 12.

Moody, William L., Newport, R. I.; Dental School, Tufts College, 1910; died June 5; aged 71.

Neary, John T., Marlboro, Mass.; Dental School, Tufts College, 1907; died June 1; aged 65.

Ostrom, Joseph E., Hollywood, Calif.; College of Dentistry, University of Southern California, 1923; died June 11.

Peck, Max, San Francisco; College of Dentistry, University of California, 1920; died June 26; aged 58.

Pierce, Frank D., West Roxbury, Mass.; School of Dental Medicine, Harvard University, 1900; died June 12.

Poyner, Frederick A., Long Beach, Calif.; Chicago College of Dental Surgery, Loyola University, 1908; died May 9; aged 66.

Rees, Charles H., Winchester, Tenn.; School of Dentistry, University of Pennsylvania, 1886; died June 10; aged 87.

Reiter, Fred W., Canon City, Colo.; School of Dentistry, University of Denver, 1912; died June 2; aged 62.

Rider, Don D., Minneapolis; College of Dentistry, University of Minnesota, 1904; died May 27; aged 71.

Rogers, Joseph A., New Smyrna Beach, Fla.; Atlanta-Southern Dental College, 1911; died April 2; aged 61.

Scott, Wallace P., Sanford, Maine; Baltimore College of Dental Surgery, University of Maryland, 1899; died May 24; aged 81.

Sinclair, James A., Asheville, N. C.; Baltimore College of Dental Surgery, 1900; died March 16.

Smith, Austin O., Albion, Ill.; Dental School, Northwestern University, 1903; died March 2; aged 81.

Smith, George A., Jr., Sugar Grove, Pa.; School of Dentistry, University of Pittsburgh, 1914; died June 5; aged 71.

Smith, Samuel L., Kingsport, Tenn.; Atlanta-Southern Dental College, 1911; died June 16; aged 66.

Spencer, Thomas F., Salem, Ill.; Department of Dentistry of Central University, Richmond, 1897; died June 3.

Stafford, Herbert H., Keokuk, Iowa; Keokuk Dental College, 1900; died June 5; aged 81.

Stork, Frederick C., Sparta, N. J.; School of Dentistry, University of Pennsylvania, 1902; died June 8; aged 71.

Thebaut, William M., Atlanta, Ga.; Atlanta Dental College, 1907; died June 11; aged 75.

Thomas, Ira J., Carnegie, Okla.; State Dental College, Dallas, 1918; died February 29; aged 63.

Thornton, Laurence E., Portland, Ore.; School of Dentistry, North Pacific College of Oregon, 1918; died May 5.

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# *Announcements*

## MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

| | | |
|---|---|---|
| Ninety-Fourth Annual Session | Sept. 28-Oct. 1, 1953 | Cleveland |
| Ninety-Fifth Annual Session | Nov. 8-11, 1954 | Miami |
| Ninety-Sixth Annual Session | Oct. 17-20, 1955 | San Francisco |

## MEETINGS OF STATE SOCIETIES

| State | Date | Place | Secretary | Address |
|---|---|---|---|---|
| **Alabama** | Apr. 9-11, 1953 | Montgomery | F. A. Finney, Jr., | 1045 Forrest Ave., Gadsden |
| **Alaska** | July 22-25, 1953 | Juneau | J. D. Smith | Box 134, Juneau |
| **Arizona** | | | E. M. Scott | 15 E. Monroe, Phoenix |
| **Arkansas** | Oct. 26-28 | Little Rock | D. M. Hamm | White Bldg., Clarksville |
| **California** | Apr. 13-15, 1953 | San Francisco | L. R. Ludwigsen | 450 Sutter St., San Francisco |
| **S. California** | Apr. 20-22, 1953 | Los Angeles | C. A. Moss | 903 Crenshaw Blvd., Los Angeles |
| **Colorado** | Oct. 5-8 | Colorado Springs | R. A. Downs | 1422 Grant St., Denver |
| **Connecticut** | | | E. S. Arnold | 37 Linnard Rd., W. Hartford |
| **Delaware** | Jan. 14, 1953 | Wilmington | J. J. Ficca | 2130 Lancaster Ave., Wilmington |
| **District of Columbia** | Mar. 15-18, 1953 | Washington | K. H. Wood | 202-1835 Eye St., N. W., Washington |
| **Florida** | Apr. 19-22, 1953 | St. Petersburg | C. T. Brown | 602 Citizens Bldg., Tampa 2 |
| **Georgia** | Oct. 12-15 | Savannah | J. M. Heard, Jr. | 803 Persons Bldg., Macon |
| **Hawaii** | | Honolulu | J. H. Dawe | 810 N. Vineyard St., Honolulu 17 |
| **Idaho** | June 18, 1953 | Sun Valley | J. F. Julian | 206 Rogers Bldg., Idaho Falls |
| **Illinois** | May 11-14, 1953 | Peoria | P. W. Clopper | 623 Jefferson Bldg., Peoria 2 |
| **Indiana** | May 18-20, 1953 | Indianapolis | E. E. Ewbank | Kingman |
| **Iowa** | May 4-6, 1953 | Des Moines | H. I. Wilson | 639 Insurance Exchange Bldg., Des Moines |
| **Kansas** | May 10-13, 1953 | Kansas City, Mo. | F. A. Richmond | 861 Brotherhood Bldg., Kansas City |
| **Kentucky** | Apr. 7-9, 1953 | Louisville | A. B. Coxwell | 1976 Douglass Blvd., Louisville |
| **Louisiana** | Apr. 29-May 2, 1953 | New Orleans | J. S. Bernhard | 2515 Line Ave., Shreveport |
| **Maine** | June 25-27, 1953 | Rockland | S. M. Gower | Box 27, Skowhegan |
| **Maryland** | | | E. L. Pessagno, Jr. | 415 Medical Arts Bldg., Baltimore 1 |
| **Massachusetts** | May 3-6, 1953 | Boston | H. E. Tingley | 12 Bay State Road, Boston |
| **Michigan** | Apr. 20-23, 1953 | Detroit | F. Wertheimer | Michigan Dept. of Health, Lansing |
| **Minnesota** | Feb. 23-25, 1953 | Minneapolis | C. V. E. Cassel | 242 Lowry Medical Arts Bldg., St. Paul |
| **Mississippi** | | Jackson | H. M. Campbell | 102 Professional Bldg., Tupelo |
| **Missouri** | May 10-13, 1953 | Kansas City | R. R. Rhoades | 201 Merchants Bank Bldg., Jefferson City |
| **Montana** | May 7-9, 1953 | Missoula | C. S. Renouard | 304 Phoenix Bldg., Butte |
| **Nebraska** | May, 1953 | Lincoln | F. A. Pierson | 1112 Federal Securities Bldg., Lincoln |
| **Nevada** | | Las Vegas | J. E. Ahlstrom | 1150 Arizona, Boulder City |
| **New Hampshire** | June 11-14, 1953 | Bretton Woods | F. E. Williams | 814 Elm St. Manchester |
| **New Jersey** | April 22, 24, 1953 | Atlantic City | J. G. Carr | 407 Cooper St., Camden |
| **New Mexico** | May 24-27, 1953 | Albuquerque | J. S. Eilar | Suite 7, Medical Arts Square, Albuquerque |
| **New York** | May 12-15, 1953 | New York | C. A. Wilkie | 1 Hanson Place Brooklyn |
| **North Carolina** | May 17-20, 1953 | Pinehurst | B. N. Walker | 608 Liberty Life Bldg., Charlotte |
| **North Dakota** | May 24-27, 1953 | Fargo | J. H. Lunday | 302 Black Bldg., Fargo |
| **Ohio** | Nov. 9-12 | Columbus | E. G. Jones | 185 E. State St., Columbus |
| **Oklahoma** | Apr. 19-22, 1953 | Tulsa | D. Robertson | 434 N. W. 13th St., Oklahoma City |
| **Oregon** | Mar. 2-4, 1953 | Portland | H. C. Fixott, Jr. | Medical Dental Bldg., Portland |

| State | Date | Place | Secretary | Address |
|---|---|---|---|---|
| Panama Canal Zone | Dec. 9 | | F. D. Buckley | Box 293, Rodman |
| Pennsylvania | May 20-22, 1953 | Atlantic City, N. J. | M.D.Zimmerman | 217 State St., Harrisburg |
| Puerto Rico | Jan. 1953 | | A. Quiñones | San German |
| Rhode Island | Jan. 13, 14, 1953 | Providence | E. L. Bessette | 1745 Broad St., Cranston 5 |
| South Carolina | June, 1953 | Greenville | J. R. Owings | 7 Medical Court, Greenville |
| South Dakota | May, 1953 | Rapid City | E. W. Elmen | Sioux Falls |
| Tennessee | May 11-14, 1953 | Knoxville | W. L. McCulley | Brown Bldg., Cleveland |
| Texas | May 10-14, 1953 | Houston | W. Ogle | 3607 Gaston Ave., Dallas |
| Utah | | | K. L. Dedekind | 914 Medical Arts Bldg., Salt Lake City |
| Vermont | May 17-19, 1953 | Woodstock | W. J. Reardon | Rutland |
| Virginia | May 4-6, 1953 | Roanoke | J. E. John | 804 Medical Arts Bldg., Roanoke |
| Washington | June 18-20, 1953 | Yakima | F. J. Dingler | 1502 Medical-Dental Bldg., Seattle |
| West Virginia | July 13-15, 1953 | White Sulphur Springs | A. B. Drake | 506 West Virginia Bldg., Huntington 1 |
| Wisconsin | Apr. 6-9, 1953 | Milwaukee | R. A. Mason | 964 N. 27th St., Milwaukee |
| Wyoming | | Casper | T. J. Drew | State Office Bldg., Cheyenne |

## MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

| State | Date | Place | Secretary | Address |
|---|---|---|---|---|
| Alabama | | | M. D. Edwards | 132 Adams Ave., Montgomery |
| Alaska | | | J. H. Geyer | P. O. Box 915, Juneau |
| Arizona | | | R. K. Trueblood | 25 N. Second Ave., Glendale |
| Arkansas | | | H. O. Weatherly | 205 Halter Bldg., Conway |
| California | | | K. J. Nesbitt | 507 Polk St., San Francisco 2 |
| Colorado | | | C. K. Phillips | 724 Republic Bldg., Denver 2 |
| Connecticut | Nov 10-15* | Bridgeport | C. G. Brooks | 302 State St., New London |
| Delaware | | | P. K. Musselman | 143 W. Main St., Newark |
| District of Columbia | | | W. T. Birthright | 1835 Eye St., N. W., Washington 6 |
| Florida | | | A. W. Kellner | P. O. Box 155, Hollywood |
| Georgia | | | S. H. Yarbrough | Medical Arts Bldg., Columbus |
| Hawaii | | | H. L. Houvener | 427 Dillingham Bldg., Honolulu |
| Idaho | | | W. K. Adams | 1624 Arlington, Caldwell |
| Illinois | Oct. 21-24 | Chicago | W. A. McKee | 503 Wood Bldg., Benton |
| Indiana | Nov. 17-20* | Indianapolis | C. A. Frech | 504 Broadway, Gary |
| Iowa | | | H. M. Willits | 719 Roshek Bldg., Dubuque |
| Kansas | | | G. L. Teall | Box 71, Hiawatha |
| Kentucky | | | R. I. Todd | Western Union Bldg., Richmond |
| Louisiana | | | A. R. de Nux | Marksville |
| Maine | | | R. A. Derbyshire | Box 387, Skowhegan |
| Maryland | Nov. | Baltimore | H. Levin | 3429 Park Heights Ave., Baltimore 15 |
| Massachusetts | | | R. A. Barrette | Rm. 33 State House, Boston |
| Michigan | Jan. 26-30, 1953<br>June 8-12, 1953 | Ann Arbor | J. L. Champagne | 3714 W. McNichols Road, Detroit 21 |
| Minnesota | | | F. A. Larson | 1632 Washington St., N. E., Minneapolis |
| Mississippi | Jan. 5-7, 1953<br>June 16-18, 1953 | Jackson | J. C. Boswell | 508 Lamar Life Bldg., Jackson |
| Missouri | | | R. R. Rhoades | 414 Central Trust Bldg., Jefferson City |
| Montana | | | V. J. Quinn | Box 865, Helena |
| Nebraska | | | H. E. Weber | 1210 Federal Securities Bldg., Lincoln |
| Nevada | | | G. C. Steinmiller | Suite 6, Masonic Temple, P. O. Box 2473, Reno |
| New Hampshire | | | D. J. Freese | 4 Wall St., Concord |
| New Jersey | Dec. 1-5**<br>Dec. 1, 2‡‡ | Philadelphia | W. A. Wilson | 150 E. State St., Trenton 8 |
| New Mexico | May 24-27, 1953 | Albuquerque | J. J. Clarke, Sr. | Artesia |
| New York | Oct. 9, 10** | New York<br>Buffalo | D. W. Beier | 23 S. Pearl St., Albany 7 |
| | Oct. 14-17§ | Buffalo<br>Albany | | |
| North Carolina | | | F. O. Alford | 1109 Liberty Life Bldg., Charlotte 2 |
| North Dakota | | | A. B. Crabtree | Ellendale |
| Ohio | Oct. 27-31 | Columbus | H. B. Smith | 322 E. State St., Columbus |
| Oklahoma | | | J. B. Cole | 706 Asp St., Norman |
| Oregon | Dec. 8-11* | Portland | F. L. Utter | 506 Pioneer Trust Bldg., Salem |
| Pennsylvania | | | A. M. Stinson | Dept. of Public Instruction Box 911, Harrisburg |

| State | Date | Place | Secretary | Address |
|---|---|---|---|---|
| Puerto Rico | | | L. C. Coll | Box 9156, Santurce |
| Rhode Island | Nov. 25, 26 | Providence | F. M. Hackett | 267 Academy Ave., Providence |
| South Carolina | | | T. C. Sparks | 1315 Pickens St., Columbia |
| South Dakota | | | O. Isaak | Tyndall |
| Tennessee | Dec. 10-15 | Memphis | F. S. Maxey | 804 Bennie Dillon Bldg., Nashville 3 |
| Texas | Oct. 20, 21‡‡ Oct. 20-24† | Houston | R. T. Weber | 312 Capital National Bank Bldg., Austin |
| Utah | | | M. W. Merrill | 820 N. University Ave., Provo |
| Vermont | | | F. A. Reid | Windsor |
| Virginia | June 8, 9, 1953‡‡ June 8-12, 1953† | Richmond | J. M. Hughes | 715 Medical Arts Bldg., Richmond 19 |
| Washington | Jan. 12, 1953 | Seattle | J. B. Keifer, Jr. | 510 Cobb Bldg., Seattle |
| West Viginia | June 22-24, 1953* | West Liberty | C. A. Laughlin | 613 Prunty Bldg., Clarksburg |
| Wisconsin | Jan. 12-16, 1953* | Milwaukee | S. F. Donovan | Tomah |
| Wyoming | | | W. A. Hocker | 212 O & S Bldg., Casper |

*Dentistry and dental hygiene.
**Dental clinical examinations.
†Dental examinations.
‡Dental written examinations.
‡‡Hygienists' examinations.

## MEETINGS OF OTHER ORGANIZATIONS

| Name | Date | Place | Secy. or Chm. | Address |
|---|---|---|---|---|
| Academy of Denture Prosthetics | Apr. 12-19, 1953 | Los Angeles | I. L. Furnas Secy. | 928 Silverado St., La Jolla, Calif. |
| American Academy of Dental Medicine | Dec. 7 | New York | W. M. Greenhut Secy. | 124 E. 84th St., New York 28 |
| American Association of Dental Schools | Mar. 23-25, 1953 | Philadelphia | M. W. McCrea Secy. | Baltimore College of Dental Surgery, Dental School, University of Maryland, Baltimore 1 |
| American Association of Orthodontists Central Section | Oct. 13, 14 | Omaha | F. B. Lehman Secy. | 1126 Merchants National Bank Bldg., Cedar Rapids, Iowa |
| American Board of Oral Surgery | Oct. 5-8 | New Orleans | L. M. FitzGerald Secy. | 718 Roshek Bldg., Dubuque, Iowa |
| American Board of Orthodontics | Apr. 22-26 1953 | Dallas, Texas | C. E. Martinek Secy. | 661 Fisher Bldg., Detroit 2 |
| American Board of Prosthodontics | Feb. 1-7, 1953 | Indianapolis | I. R. Hardy Secy. | Tufts College Dental School, 136 Harrison Ave., Boston 11 |
| American Public Health Association | Oct. 20-24 | Cleveland | R. M. Atwater Exec. Secy. | 1790 Broadway, New York 19 |
| American Society for the Advancement of General Anesthesia in Dentistry | Oct. 27 | New York | M. H. Feldman Exec. Secy. | 750 Fifth Ave., New York |
| American Society of Oral Surgeons | Oct. 8-11 | New Orleans | R. F. Whalen Exec. Secy. | 1112 E. Clay St., Richmond, Va. |
| Chicago Dental Society | Feb. 8-11, 1953 | Chicago | K. S. Richardson Exec. Secy. | 30 N. Michigan Ave., Chicago 2 |
| Council on Dental Education, Dental Aptitude Tests | Oct. 24, 25 | | S. Peterson Secy. | 222 E. Superior St., Chicago 11 |
| Dallas Mid-Winter Dental Clinic | Jan. 25-28, 1953 | Dallas, Texas | W. C. McCaskill, Jr. Gen. Chm. | 1329 Medical Arts Bldg., Dallas, Texas |
| Great Lakes Society of Orthodontists | Nov. 10-12 | Toronto, Canada | C. R. Anderson Secy. | 402 Loraine Bldg., Grand Rapids, Mich. |
| Greater New York Dental Meeting | Dec. 8-12 | New York | A. E. Corby Chm. | Hotel Statler, Room 106A, New York |
| International Academy of Anesthesiology | Oct. 15 | New York | I. G. Tomack Exec. Secy. | 355 E. 149th St., New York 55 |

| Name | Date | Place | Secy. or Chm. | Address |
|---|---|---|---|---|
| **International Association for Dental Research** | Mar. 20-22, 1953 | Philadelphia | E. H. Hatton Secy. | 311 E. Chicago Ave., Chicago 11 |
| **National Board of Dental Examiners** | Dec. 1, 2 | | S. Peterson Secy. | 222 E. Superior St., Chicago 11 |
| **New England Dental Society** | Oct. 1, 2 | Boston | A. R. Wilson Secy. | 43 Farmington Ave., Hartford, Conn. |
| **New Orleans Dental Conference** | Nov. 9-12 | New Orleans | M. R. Matta Secy. | 629 Maison Blanche Bldg., New Orleans |
| **Northeastern Society of Orthodontists** | Nov. 10-11 | Montreal, Canada | O. Jacobson Secy. | 35 W. 81st St., New York |
| **Odontological Society of Western Pennsylvania** | Nov. 11-13 | Pittsburgh | W. E. Craig Secy. | 206 Jenkins Bldg., Pittsburgh 22 |
| **Pan American Odontological Association** | Dec. 10 | New York | R. H. Brodsky Acting Exec. Secy. | 14 E. 81st St., New York |
| **Southeastern Society of Oral Surgeons** | Mar. 6, 7, 1953 | Birmingham, Ala. | C. F. Landeis Secy. | 316 James Bldg., Chattanooga, Tenn. |
| **Southwestern Society of Orthodontists** | Oct. 26-29 | San Antonio, Texas | F. A. Boyd Secy. | 1502 N. Third, Abilene, Texas |

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*(Applications should be received by Nov. 4, 1952)*

**April 13-14, 1953**
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*Circulars of information describing the National Board Examiners may be obtained by writing:*

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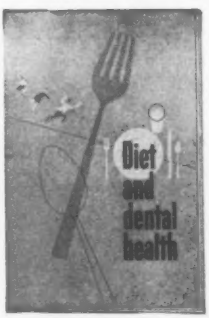


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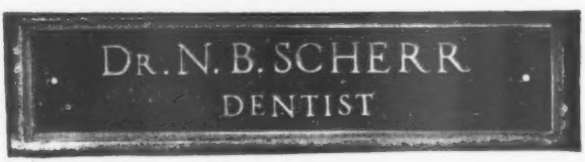


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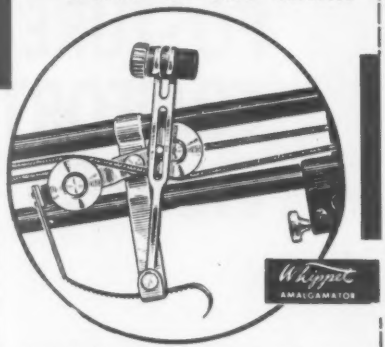


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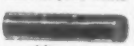

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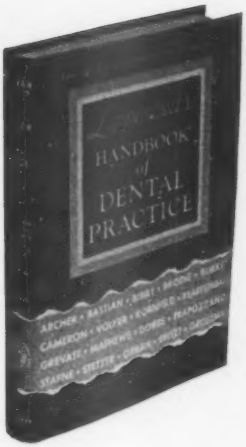


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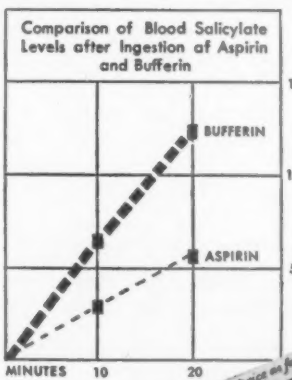

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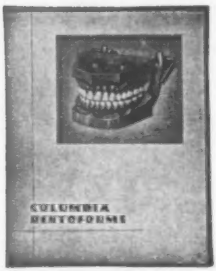


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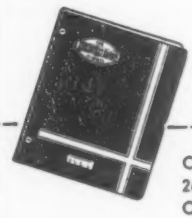

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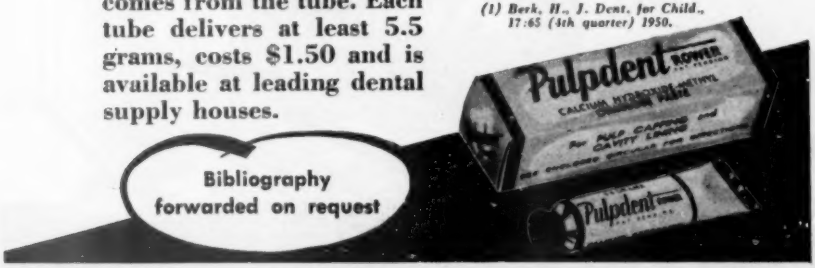


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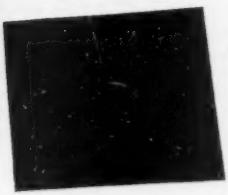

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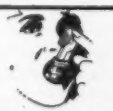

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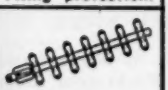

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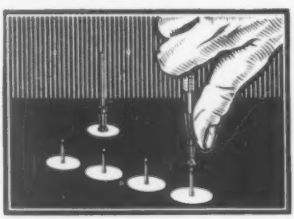

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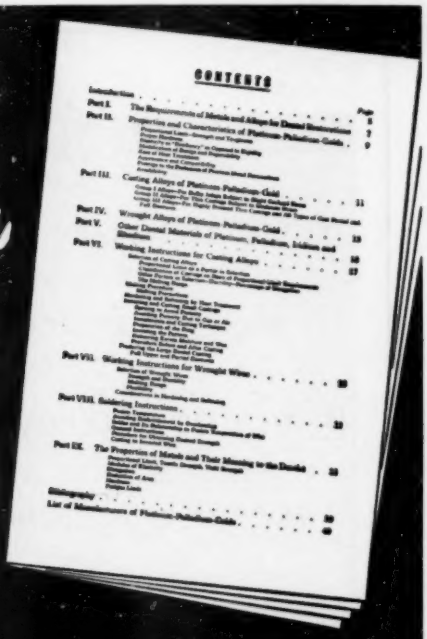
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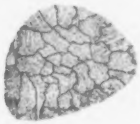
**F** FOR FINE-GRAIN STRUCTURE . . . 

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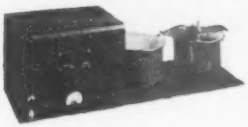
**T** TI-LECTRO POLISHED . . . 

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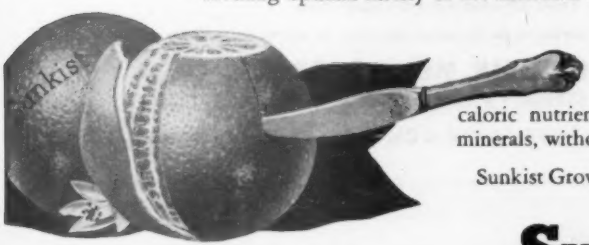


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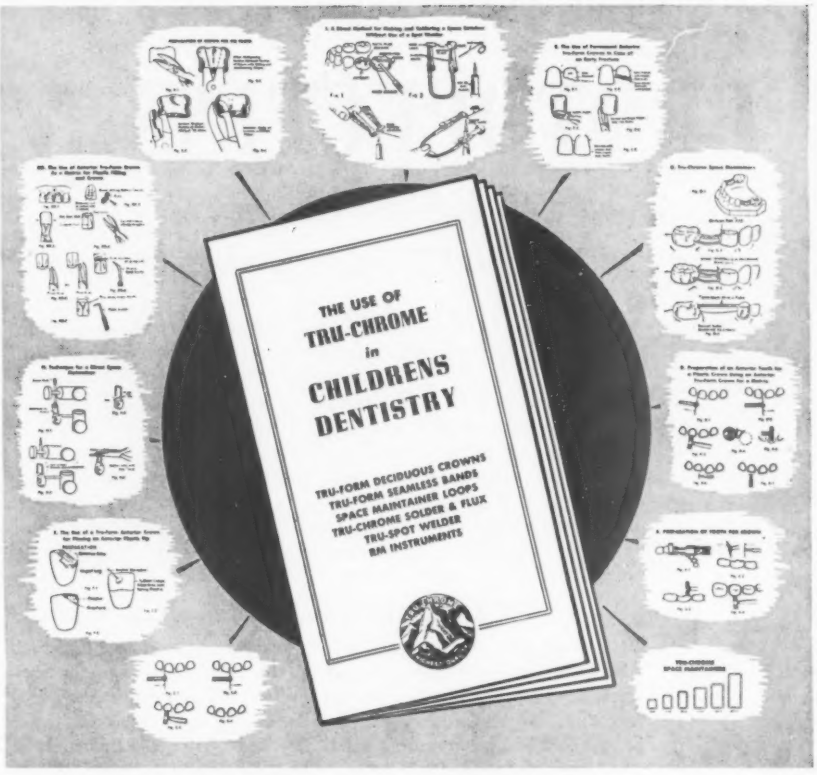


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## created by frictional heat of rotating cutting instruments

The following chart is based on data from a study recently conducted by the School of Dentistry, University of Michigan, Ann Arbor, Mich.*

| TYPE BUR | COOLANT | DEGREES F. RISE AT 1 LB. PRESSURE | | | |
|---|---|---|---|---|---|
| | | 2000 RPM | 4000 RPM | 6000 RPM | 10000 RPM |
| #37 Steel | None | 37° | 60° | 78° | 112° |
| | Air Only | 17° | 25° | 33° | 43° |
| | Air-Water Spray | 4° | 7° | 9° | 12° |
| #37 Tungsten Carbide | None | 26° | 42° | 57° | 84° |
| | Air Only | 17° | 25° | 33° | 45° |
| | Air-Water Spray | 3° | 6° | 9° | 12° |
| #701 Diamond | None | 21° | 30° | 39° | 52° |
| | Air Only | 9° | 14° | 18° | 25° |
| | Air-Water Spray | 2° | 4° | 7° | 9° |

* Report Published in New York Journal of Dentistry, 22:147-157 (April) 1952

NOTE: Degrees F. represent temperature rise above initial temperature of operating area. For example, at intermittent operation of 2 seconds cutting and 1 second rest, *without coolant*, a #37 steel bur at 1 lb. pressure and 6000 rpm increases the temperature 78° F. Accepting 90° F. as the initial temperature of the operating area, the cutting operation, therefore, brings the temperature in the tooth structure up to 168° F.

It can be readily seen that, even at minimum operating speeds and pressures, rotating cutting instruments create excessive heat, with needless risk of serious damage to tooth tissue and pain to the patient.

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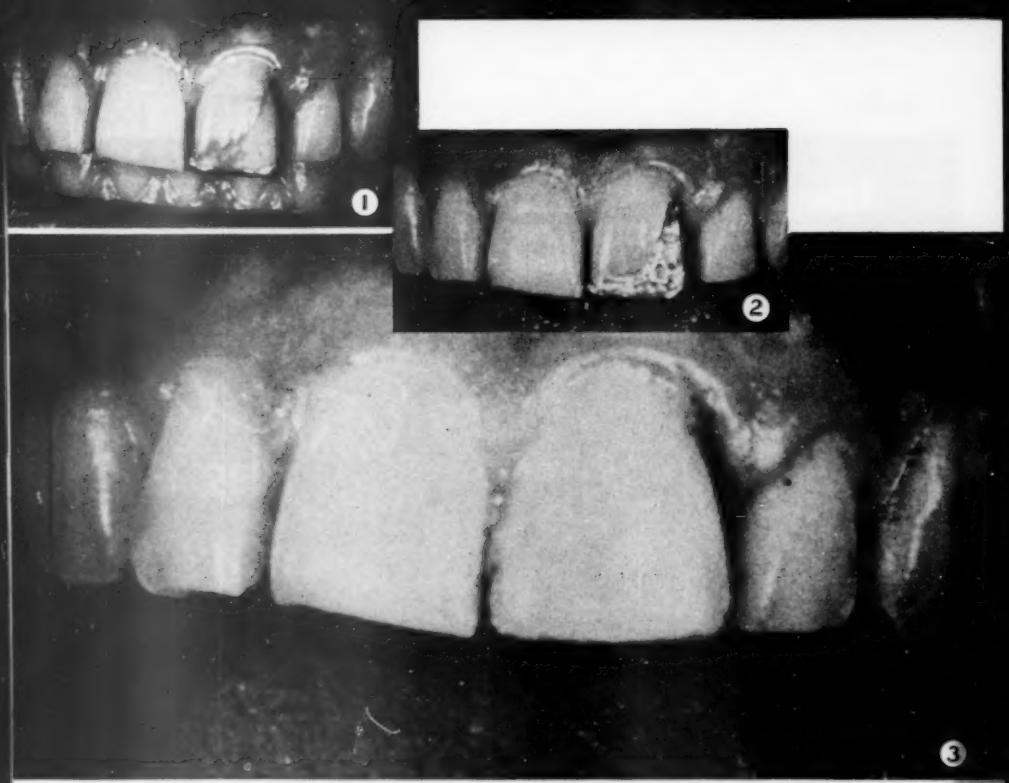

Distal Class IV filling in upper left central, placed 1950

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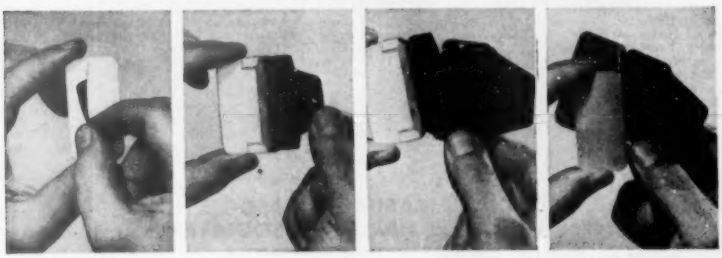

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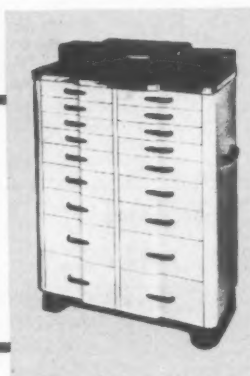

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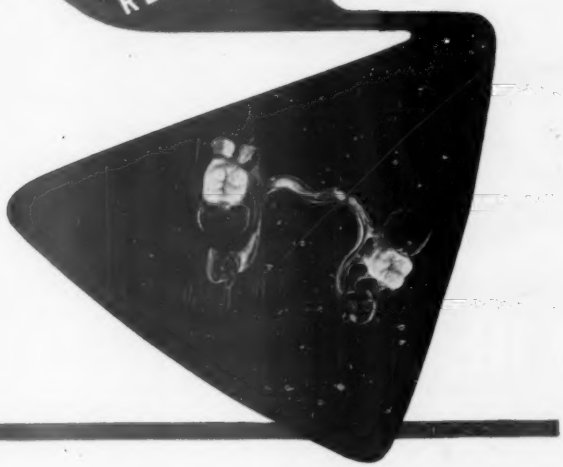

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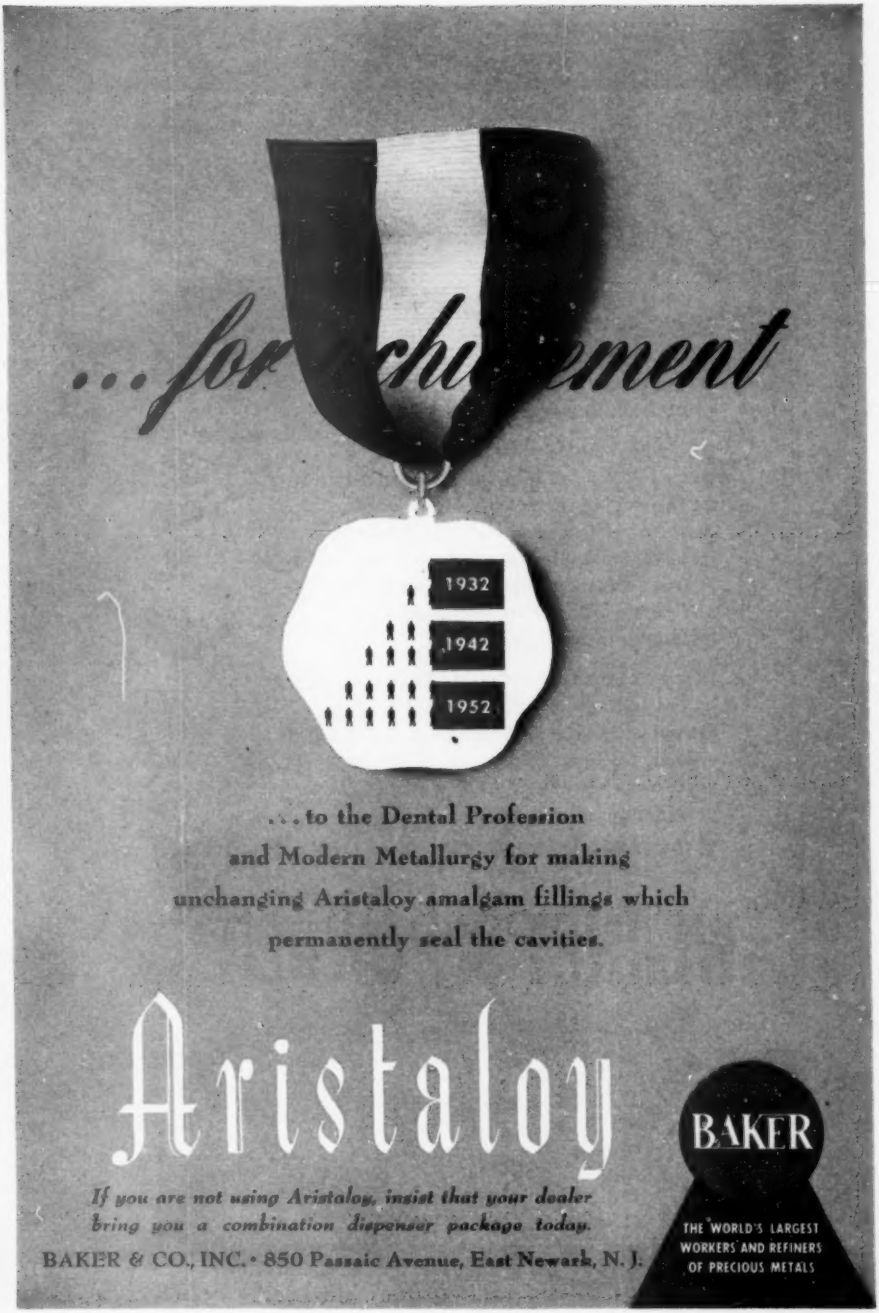
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Please send me professional samples of Wernet's Powder.

DR._____
Please Print

ADDRESS_____

CITY_____ ZONE____ STATE_____

# WERNET DENTAL LORE

OCTOBER 1952

The average dental bill of the 60 million patients treated by dentists in 1950 was $16.50, an increase of 54% over the $10.70 average for 1935-1939. However, this 54% increase not only lags behind the 72% increase in the rate of the overall cost of living, but is only about five-sixths as great as the increase in the rate of all health expenditures.

• • •

How young can a dentist get? In 1948, the average dentist reported having been 21 years in practice. In 1952 he reported 20.4 years. Let's see, if the curve continues at that rate, in another hundred and fifty years . . .

• • •

Dr. Robert Arthur certainly rates, historically, as the No. 1 man of American dentistry. He attended the first dental school in this country . . . was its first graduate . . . was among the founders of the Pennsylvania College of Dental Surgery . (1863) . . . was the first dean of that college. He invented a cohesive gold filling, and a method of dental prophylaxis called "Arthurizing". He was a skillful practitioner and prolific writer.

• • •

Naval dental personnel operating in the Korean theater in their mobile dental units have been performing necessary dental chores and caring for wounded Marines so gallantly under fire that 62 of their officers and technicians had been decorated up to February 1 of this year.

• • •

The Public Health Service estimates it would take 430,000 dentists to provide in a year all the accumulated dental work needed by Americans; and 150,000 to maintain such care once all needs were met.

• • •

Tapping the many species of Sterculia trees in India for their gummy water-absorbing exudate karaya (the basis of Wernet's Powder) is a seasonal operation which is performed only during the hot, dry spells.

# THERE'S A Foredom MODEL for Every EXTRA-ENGINE REQUIREMENT!

**$42.50**
LESS HANDPIECE
**$63.50**
WITH DORIOT HANDPIECE

NEW
*Allcord*
MODEL
21

***HERE ARE A FEW REPRESENTATIVE MODELS***

**MODEL 88**

Allcord Engine. Also available in wall type (No. 98).

**MODEL 7**

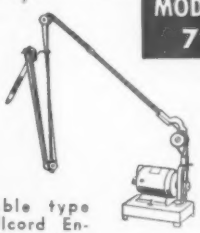

Table type Allcord Engine for heavy-duty use.

**MODEL 505**

Cable Engine only $21.00. Heavy duty models in overhead and table types also available.

## *Treat Yourself*

**to that auxiliary allcord engine you've always wanted at a price that's so easy on your budget.**

**AN EXCELLENT MODEL FOR DENTAL STUDENTS**

***Order One Today From Your Dealer***
***If he cannot supply you, write us direct. Catalog D-5723, on request.***

## FOREDOM ELECTRIC CO.
## 27 Park Place, New York 7, N. Y.

DENSENE "33" GUARDS AGAINST DENTURE BREAKAGE

# Densene 33

. . denture resin is the most reliable precaution you can take to guard your cases against denture breakage. Another equally appreciated advantage is the precision processing you get with Densene "33"—you are assured of accurate adaptation, stability and freedom from warpage in prolonged mouth service.

DENSENE "33" ASSURES DENTURE STABILITY

Densene dentures are delivered by laboratories in the attractive Densene box with this certificate

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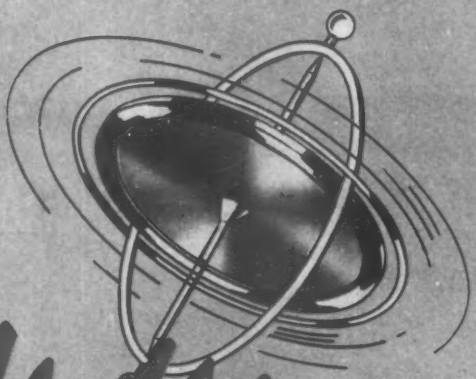

# No Vibration!

**Busch Burs are engineered to work with a gyroscopic smoothness that is a kindness to your patients. The blade sequences cut with a swift, smooth, scalpel sharp action under lightest pressure . . . every shaft is *guaranteed* to be absolutely true.**

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*Only* DuraBase *can do a* DuraBase *job!*

**of PERMANENT REBASING at the chair...**

DuraBase

Tens of thousands American Dentists . . . thousands more in Canada, Europe and Latin America have rebased well over a million dentures with DuraBase . . . and they're continuing to order and re-order.

Be safe! Be sure! Demand DuraBase for successful rebasing at the chair. The $10.00 package is sufficient for more than twenty applications. DuraBase results are positive — every time. Your satisfaction is guaranteed.

*You can now tell your patients their dentures can be refitted while they wait*

*Reliance* DENTAL MFG. CO.
22 EAST VAN BUREN STREET • CHICAGO 5, ILL.

# *for oral lesions due to vitamin B and C deficiencies*

# Vitetrin

*Basic Formula Vitamin Tablets Squibb*

**Vitetrin** (formerly Basic Formula Vitamin Tablets Squibb) supplies therapeutic doses of four critical water-soluble vitamins essential for correction of oral lesions caused by B and C deficiencies. Vitetrin is a clinically proved formula as described and used by Jolliffe and Spies. (Thiamine content raised to 10 mg.)

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|---|---|
| Thiamine Mononitrate | 10 mg. |
| Riboflavin | 5 mg. |
| Niacinamide | 150 mg. |
| Ascorbic Acid | 150 mg. |

*Dosage:* 1 or 2 tablets daily.
*Supply:* Bottles of 30, 100 and 250.

VITETRIN® IS A TRADEMARK OF E. R. SQUIBB & SONS.

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Cream now packaged in screw-cap jar instead of metal tube—Quicker, easier to spoon out exact amount of cream needed to blend with powder—no delay, no wasted material!

Handy screw-cap jar replaces metal tube—saves time, material!

SAME FORMULATION—
SAME SUPERB ACCURACY—
SAME CONSISTENTLY
SATISFACTORY RESULTS—

Ideal for non-pressure or pressure technics. Pleasant to patient and user. Not sticky or messy. Retains most minute detail.

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Lengthwise fibers of pure, uncoated cotton held securely in shape by thin strands of fine, soft thread, sealed at every crossing

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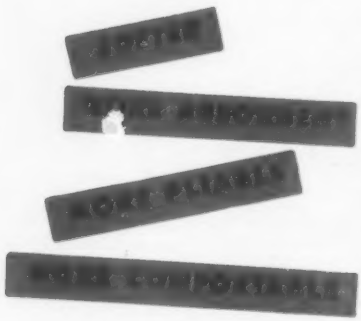
# DENTAL COTTON ROLLS

**This completely new type of all-cotton roll brings you advantages no other roll can offer:**



The natural softness and pliability of pure absorbent cotton, free of any stiff coating material. Greater absorbency, because the all-cotton surface comes in immediate contact with the saliva. Complete protection against seepage, since these rolls fit the buccal curvature snugly and comfortably, without forming stiff, harsh wrinkles. Freedom from chemical or mechanical irritation during use and upon removal . . . Richmond Rolls never stick to the oral mucosa or pull off bits of tissue.

•

**SUPPLIED** in three sizes, Large, Medium and Small, in 6 inch and 1½ inch lengths.
*Sterilized after packaging.*

**Write for a generous testing sample.**

## RICHMOND DENTAL COTTON COMPANY

**Box 2176, Charlotte 1, N. C.**

We also carry a full line of pellets and pellet dispensers.

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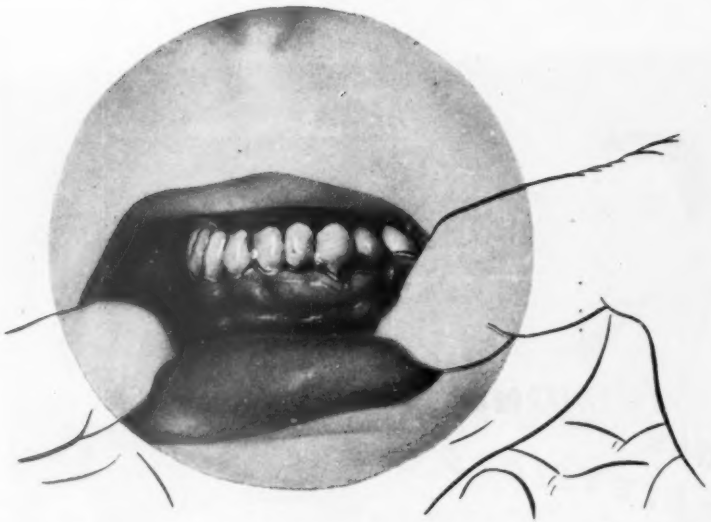

to saturate affected oral tissues with penicillin

# ORYGENE®

**Penicillin Chewing Troches**
**Parke-Davis**

ORYGENE Penicillin Chewing Troches bathe affected oropharyngeal tissues in steadily maintained concentrations of penicillin. This "saturation" of affected tissues is assured by the gradual release of penicillin from ORYGENE's chicle gum base, and by salivary dispersion in the process of mastication.

ORYGENE Penicillin Chewing Troches have a fresh peppermint flavor which encourages retention in the mouth – further assurance of adequate exposure time at the site of the infection.

Dosage and Method of Use. One ORYGENE troche should be chewed at a time, preferably for 30 minutes. In treating infections caused by Vincent's organisms, a daily total of 4 to 6 troches will usually produce clinical results within 24 to 48 hours, although precautionary treatment should be continued for several days thereafter. It may be necessary to supplement ORYGENE by parenteral administration of penicillin, or by other measures as indicated.

Packaging. Each ORYGENE troche containing penicillin G, crystalline potassium salt, 20,000 units, is individually wrapped, sealed in metal foil – no refrigeration necessary. Available on prescription in packages of 12.

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Parke, Davis & Company

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## IMPRESSION PLASTER

The choice for quickly made, dependable impressions, for saving time, avoiding trouble, makeovers. Reproduces every detail of teeth, tissue . . . sets rapidly, accurately, without expansion or distortion . . . breaks with clean fracture.

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Holds case to unchanging dimensions during curing. Laboratory control during manufacture assures uniformity, positive reproduction for perfect fit and articulation.

**ALSO:** Standard Set Plaster—Hard Plaster—Laboratory Plaster—Vulcanizing Stone—Flasking Compound.

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( ) Wintergreen ( ) Unflavored

Dr.....

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City.....State.....

# MIZZY NEEDLES

Stronger, sharper than any you have ever used. All regular gauges and lengths,

**Plus**

**28 ga. and 30 ga.**

Thinner, sharper, stronger than you would believe possible,

**Plus**

**CONICAL NEEDLES**

Give rigidity of a heavy gauge needle, with the ease of penetration of a fine gauge needle.

*Available in Cartridge, Luer, Schimmel and screw-on Hub types.*

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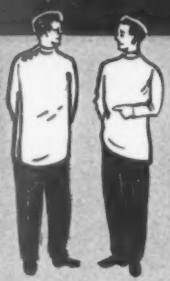
ACRALITE

# *Only fastcrown prescribes the true non-pressure compensating brush technique**



**— which, by warming the powder compensates for volume loss during polymerization . . .**

ACRALITE
**fastcrown**
FILLING PLASTIC

The major purpose of the Non-Pressure Compensating Brush Technique* is to compensate for volume loss during polymerization! Only FASTCROWN, of all the fine particle size filling plastics, is suitable for the *true* Non-Pressure Compensating Technique.* Compensation is obtained by inserting a small bead of the material, inducing it to cure as rapidly as possible, undergoing its loss of volume. When the next bead is added, it compensates for the loss of the first portion and then, in turn, polymerizes. *Compensation for shrinkage is commensurate with the degree of polymerization attained in the first portion before the second is inserted.* The *true* Compensating Technique* used with FASTCROWN provides this maximum polymerization.

## ONLY *fastcrown* OFFERS ALL THESE ADVANTAGES

- FASTCROWN restorations are superior, no matter what technique may be used.
- FASTCROWN cures as fast; uses less liquid.
- FASTCROWN has less shrinkage.
- FASTCROWN is non-irritating to the pulp.
- FASTCROWN possesses color stability.

An important 20-page booklet on FASTCROWN and the Non-Pressure Compensating Technique* is available on request.

*Developed by Frank H. Neslon

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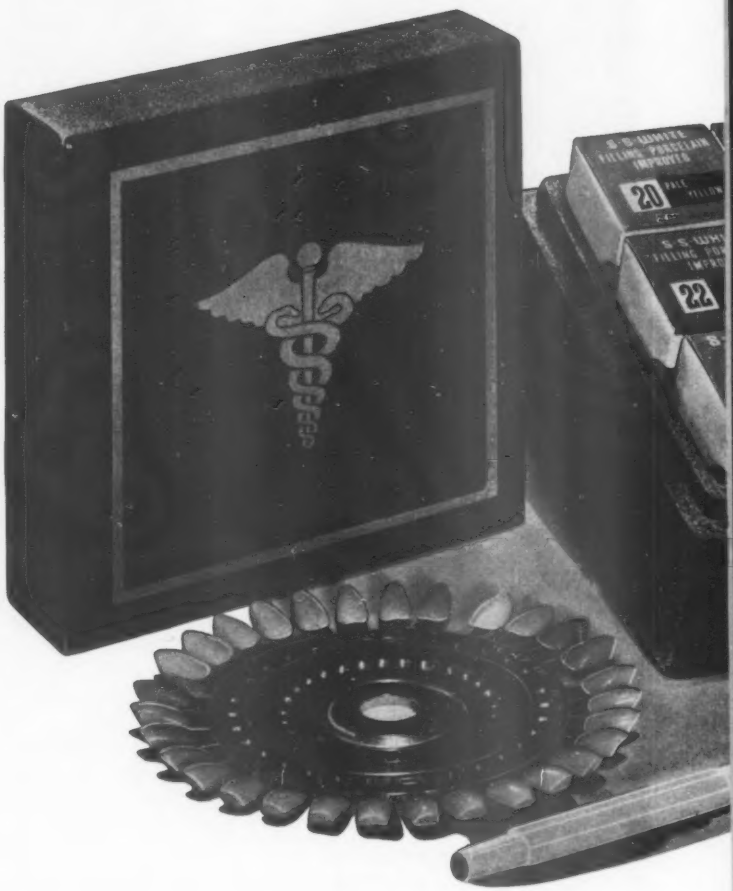
ACRALITE CO., Inc. 230 WEST 41st ST., N.Y. 36, N.Y.

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2 Filling Porcelain Improved Powders No. 21
1 each Filling Porcelain Improved Powders Nos. 20, 22, 25, 26, and A
2 Filling Porcelain Improved Liquids

*Packed in a handsome leatherette case*

Price.....$16.00

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# 7-2 PACKAGE

## A GOOD BUY

You will appreciate Filling Porcelain Improved for its hardness, insolubility, color value, adaptability, translucence, fluorescence, ease of mixing, insertion and finishing.

Patients whose teeth have been restored to natural functioning and normal appearance with Filling Porcelain Improved, will find the restorations a source of constant satisfaction.

S. S. White Filling Porcelain Improved has everything that can be desired in a "silicate".

**NOTABLE PHYSICAL PROPERTIES**

High Compressive Strength: 30,000 lbs. per sq. in. (7 days)
Low Solubility: 0.9% by weight (7 days)
Exceeds requirements of A. D. A. Specification No. 9

**THE S.S.WHITE DENTAL MFG. CO.**
**Philadelphia 5, Pa.**

# WHY TOLERATE INTERNAL STRAINS AND DENTURE DISTORTIONS

. . . When you can be SURE with

# Palatex-51

REG. U.S. PAT. OFF. AND IN FOREIGN COUNTRIES

# COLD CURE DENTURE ACRYLIC

**FREE!**

One 8-ounce bottle of

*Acryfoil*

the superior acrylic tinfoil substitute (sells for $1.50) with each package of Palatex '51.

Attach this coupon to your order and mail to J. Bird Moyer Co., giving name of your dealer.

Boiling and cooling acrylics create internal strains that result in some denture distortion and weakening, no matter how stable the base.

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***Available in light, medium, dark pink — and clear***

***Complies with A.D.A. Specification No. 12***

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J·B M CO. INC.

Sole Distributor

THE J. BIRD Moyer CO., INC.

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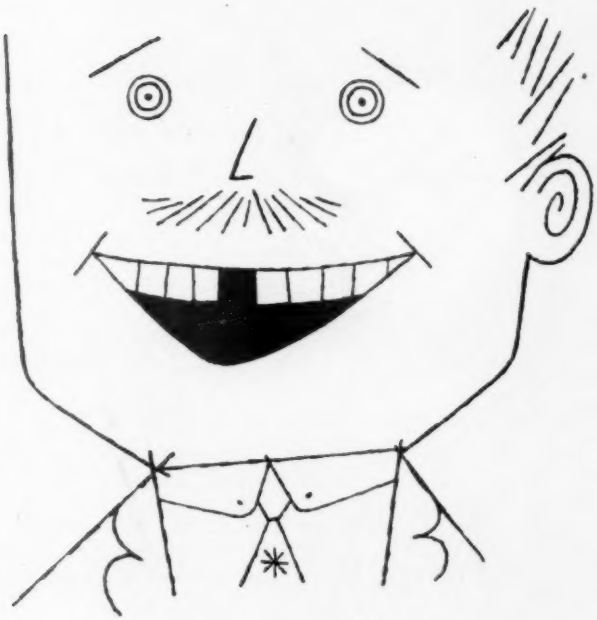

# didn't feel a thing!

. . . Nor, in most cases, will he feel a thing afterward if you anesthetize with Abbott Procaine Dental Cartridges.

These ready-to-use cartridges assure your patient effective local anesthesia with only minimal postoperative pain, and no untoward or painful tissue irritation. While you, Doctor, are assured of solutions that are sterile, isotonic and adjusted to a pH that provides maximum stability.

Each cartridge is plainly labeled, and will fit all standard syringes. Your usual source of supply has Abbott Procaine Cartridges in all four commonly-used concentrations. Abbott

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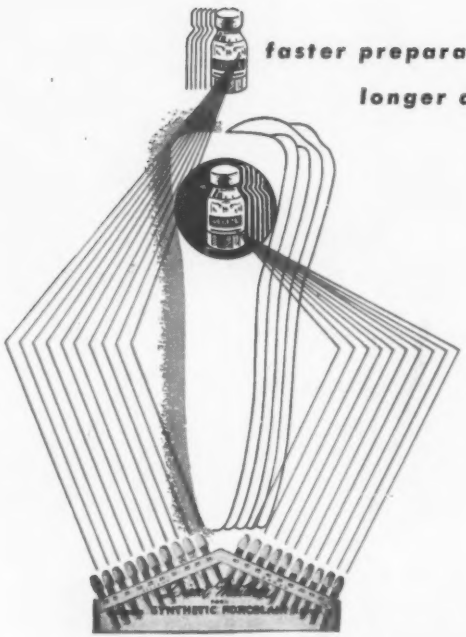
2% with Epinephrine 1:60,000, 1:50,000, 1:30,000
4% with Epinephrine 1:50,000




*silicate restorations*

*with*

*Caulk*

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**Faster.** With a *single* Synthetic Porcelain powder, you can match the color of any tooth. The "Direct Matcher" Shade Guide simplifies shade identification; "pre-blended" powders eliminate tedious color blending.

**Longer.** Because Synthetic Porcelain is *lower in solubility* than any other silicate tested, restorations stand up far longer. They resist "washing out" for 20 years and even more, as clinical results have proved.

For modern materials call on **CAULK**
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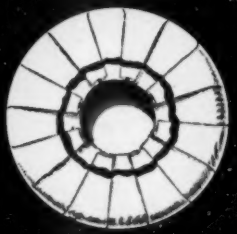

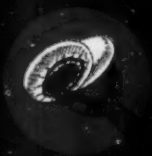

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**Sanitary Headrest Covers**
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Practical and individual, Johnson & Johnson Headrest Covers protect both patient and headrest pad. These moisture-resistant covers are disposable — they provide fresh protection for each patient. Order them in boxes of 500, or 100; your patients will appreciate your thoughtfulness.

*efficacy and elegance in dental technique*

disposable

**Dental Bracket Covers**
**to enhance your chair-side table**

Johnson & Johnson Dental Bracket Covers lend an immaculate, efficient air to your bracket table. They speed table clearance and thereby reduce to a minimum time lost between patients. Their high quality, heavy paper silences clattering instruments. Available in two diameters: 13½" in boxes of 500's and 100's, and 13 & 16 in boxes of 100's only.

Dental Division

J&J

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RETAINER
WITH STAINLESS STEEL
"WINDOW-OPENING"
MATRIX BAND
A real TIME and
LABOR SAVER!
The ONLY retainer you can apply from the LINGUAL! ... Used with the new, novel "Window-Opening" Band a full, unobstructed view of the entire operating area is assured. Keeps mucous, saliva, blood out of the cavity. No gingival overhang. No "land-sliding" of filling material. Assures quicker, easier work and more satsfactory, beautiful restorations. Simplifies making wax patterns too!... Get yours today.
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## A PRICELESS POSSESSION

YEARS of study, sacrifice and hard work are needed to develop your technique of dental practice to its highest degree of efficiency. Your professional skill becomes your trademark of dental leadership. To help you utilize this priceless possession to its fullest, your office should be equipped with the best. For over sixty years Ritter has been the leader in dental equipment the world over. Enjoy the benefit of modern Ritter equipment . . . ask your Ritter dealer for a demonstration.

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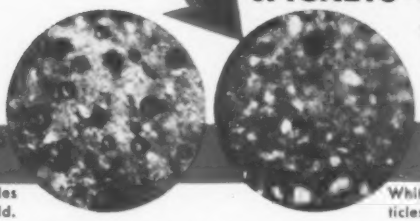
## NU-DENT VACUUM FIRED PORCELAIN

**JACKETS-BRIDGES**
**VENEERS**
**INLAYS**



Large spots are air bubbles which pockmark entire field.

White flecks are quartz particles. Note dense structure.

These photomicrographs were made under polarized light at 200X. Reproduced here reduced one-third.

NU-DENT Vacuum Fired Porcelain Restorations possess esthetic qualities and physical properties unattainable in conventionally fired porcelain —

- **A Vibrant Brilliance and Translucency.**
- **Exquisitely Natural Shading.**
- **Freedom from Pits, Pores and Air Pockets.**

See Comparative Photomicrographs above.

- **Notably Increased Strength, Hardness, Density.***

All these superlative qualities result from the removal of gases and entrapped air from the porcelain by the high vacuum (635 mm. mercury) in which it is fired.

VACUUM Firing of Hand-Carved Porcelain Restorations was originated by Nu-Dent, who developed the special high fusing porcelains necessary for accurate shade control; developed the process; and designed and built the special high vacuum firing furnaces.

Genuine, Vacuum Fired Porcelain Restorations are obtainable only from Nu-Dent Porcelain Studios. However —

***Wherever You Practice, You Can Have Nu-Dent's Genuine, Vacuum Fired Porcelain Restorations.***

**Two Strategically Located Studios and Use of Air Mail Delivery, where feasible, Assure Prompt, Efficient Service. Ask about our "Mailing Aids" and How They Simplify Mailing Your Cases to Us.**

**TRY A NU-DENT VACUUM FIRED JACKET — *You Can Even SEE the Difference.***

Write Studio Nearer You for Literature and Price List.

*Report by nationally recognized testing laboratory sent on request. Nu-Dent Vacuum Fired Porcelain is so hard and dense that, if ground, it can be repolished to a high glaze with fine pumice and a felt wheel.

ALL NU-DENT PORCELAIN RESTORATIONS ARE NOW VACUUM FIRED

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**CRestview 5-8717**
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**220 West 42nd Street**
**New York 36, N. Y.**
**LAckawanna 4-3591 to 6**

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White Dental Mfg. Co., The S. S..A-72, A-73

# natural reproductions

The forms of **Trubyte Bioform Teeth** are the result of careful and prolonged study of thousands of extracted natural teeth, hundreds of skulls with good dentition, and hundreds of patients. Those forms that have been selected are representative of the appearance of the finest natural teeth.

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NEW IN EVERY WAY

trubyte Bioform® teeth

the finest "vacuum fired porcelain teeth

**There is nothing mechanical or artificial looking about TRUBYTE BIOFORM ANTERIORS.**

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Labial markings vary from one form to another. No two forms in any classification are identical even in outline.

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Each form of **Trubyte Bioform Teeth** is a reproduction of six natural anteriors that have been selected for their size and proportion, appropriate outline and pleasing labial characteristics.

**TRUBYTE BIOFORM TEETH are not easily distinguished from natural teeth.**